FOOD MANUFACTURE

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FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible

Modern food manufacturers know that articles of diet are improved by the use of milk in one form and another.

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FOOD MANUFACTURE

Vol. X, No. 10 October, 1935

F.I.B. Report

WE DRAW the attention of our readers to the Report of the Food Investigation Board for the year 1934, which was published in August. We make no attempt to discuss this Report here, for it goes without saying that everybody in the food business will, or at least should, provide himself with a copy—the price is only a matter of 4s. Its 260 pages comprise a record of the most important scientific investigations in the domain of foodstuffs for the year in question. It is indispensable to the technical man.

Small Goods Production

We also take this opportunity of directing attention to another useful publication (issued by Leonard Hill, Ltd., publishers of FOOD MANUFACTURE) entitled *Small Goods Production*. This is a practical handbook on the manufacture of sausages and other meat products, and has been written by Mr. Frank Gerrard, who is a lecturer on this subject at the Smithfield Institute. He is, one may safely say, the greatest authority in this country on the production of small goods, and his object in writing the book is to supply a general outline of the methods commonly employed in the small factory. It is the only book of its kind which has been published, and in our view its principal merit consists in the fact that it is not a mere heterogeneous collection of recipes (although these are given by way of examples), but it puts the subject on a rational technical basis.

A College of Dietetics

An institution which seems destined to play a really important rôle in the food world, even in the manufacturing part of it, is the London College of Dietetics, which commences its whole-time course at the beginning of the present month. It is an institution which has crept on us unawares, so to speak. We had known of its existence for some time past—in fact, from the time it was founded a few years ago—but we had not realised the extraordinarily rapid strides which have been made in this short time.

The college undertakes instruction in the scientific study of dietetics, which is in the hands of a well-qualified teaching staff. Hospital nurses are, for example, trained to fill posts as dietitians. But other and wider means of education are employed, such as the organisation up and down the country of lectures on food values, the choice of foods, food economy, and so on. Then there are also cooking demonstrations and "Health Weeks", and shop window displays suggesting various food combinations and relative values—all of which are of considerable interest to the industry, as they will have an important bearing on the moulding of public ideas in respect of the purchase of food products.

It is interesting to note that the college is under the auspices of the National Health Trust.

International Oils and Fats Commission

An event of considerable importance is the sixth meeting of the International Commission for the Examination of Oils and Fats, which will be held in London, October 1 to 5 inclusive, at the Royal Society, Burlington House, W. 1.

As noted on another page, the object of the Commission is to prepare standard methods for the analysis of oils, fats, and soap. These methods are periodically revised in the light of experience gained from year to year.

We see that the British Standards Institution is conducting the arrangements for the reception and that the meeting will be presided over by Mr. E. R. Bolton, F.I.C. Visits will be made to research departments and factories, and a number of social functions have been arranged, including a luncheon to be held at the Royal Automobile Club on October 1 and a dinner at the Salters' Company at the end of the week.

Dairy Produce Trade

The good work carried out by the Intelligence Branch of the Imperial Economic Committee is illustrated once again by the recent publication

entitled *Dairy Produce Supplies in 1934*, which reviews the trade in imported dairy produce, poultry, and pig products for the past year.

In addition to the comprehensive figures given for the U.K., certain of the more important statistics of the external trade in dairy produce of other countries have also been included, together with short summaries of the trend of international trade. Recent legislative measures affecting the trade in dairy produce and allied commodities, both in this and other countries, have been added as being of special significance at this time.

Measurement of Rancidity

It is interesting to note that Mr. M. Pyke, B.Sc., presented a paper to the Society of Public Analysts, held on May 1, in which was described a colorimetric method for the quantitative measurement of rancidity.

One of the main disadvantages of the Kreis test is that a quantitative interpretation is difficult to obtain and often inaccurate. It is hard to avoid the formation of emulsions, and a considerable amount of oil is necessary. This renders the test unsuitable for the examination of cereal products, where the oil must first be extracted before every test. The Pyke method was, on the other hand, devised, in the first place, to investigate the auto-oxidative changes in the fat of the wheat-germ. However, the method has been used on other cereals and animal products and on a variety of oils as such.

Bacteriological Analysis of Milk

C. S. Bowers and G. J. Hucker, of the New York State Agricultural Experiment Station at Geneva, N.Y., have recently given an account (Technical Bulletin No. 228, March, 1935) of their work on the composition of media for the bacteriological analysis of milk. In particular they enquired into the possible modifications of standard agar recommended by the American Public Health Association for use in the standard methods of milk analysis which is, however, always satisfactory.

The medium that was discovered to give the best results in developing all the usual and unusual types of bacteria found in the samples ordinarily examined in milk control laboratories was one containing 0·5 per cent. tryptone, 0·1 per cent. glucose, 0·5 per cent. fresh skim-milk, and 1·5 per per cent. agar.

Shredded Suet

Mr. F. C. Bullock, B.Sc., F.I.C., Public Analyst and Official Agricultural Analyst to the City of Leicester, has recorded some instructive observations in his report for 1934. For instance, in the case of shredded suet he remarks that there is no legal ruling on the composition of this product, but a resolution passed by a Committee of Public Analysts in 1931 that samples containing less than 83 per cent. of fat should be reported "adulterated" has been generally accepted.

It may be mentioned that several brands of this convenient commodity have been put on the market in recent years in which no added starch is used. These samples analyse near 100 per cent. of fat, and the shreds appear to keep separated quite satisfactorily.

Potted Meat

Mr. Bullock says with regard to potted meat that complaints in previous years have been in respect of starchy filling material, or the use of preservatives contrary to the regulations.

Of twenty-one samples received in 1934, five were condemned on account of excess water content—*i.e.*, over 70 per cent. water. A good deal of discussion has taken place from time to time concerning what should be the composition of potted meat; and the adoption of some generally acceptable standard seems to be called for. The drawing up of such a standard is not quite so straightforward as would appear, since, besides the question of food value, that of consistency and "spreadability" enters. And the consistency is not merely dependent on water content, but is affected also by the fat and salt content and the presence of small amounts of other substances which may or may not legitimately be present.

Two things seem clear: (1) Samples of potted meat should be free from preservative; (2) samples should also be free from all starchy filling material, unless described as meat *paste*.

A maximum water content of 70 per cent. easily includes the majority of present-day samples; if the water exceeds that figure, it is either self-evident by the gravy-like appearance of the sample, or special steps have to be taken by the maker to enable the meat to retain the large amount of water.

Ageing of Flour

It is a comparative rarity these days to receive scientific papers from Russia, but one of great interest has recently been published by Natalie P. Kozmin, of the Scientific Institute for Cereal Research, Moscow. The paper is on the "Ageing of Wheat Flour and the Nature of this Process". This is a problem that has exercised the minds of cereal

chemists for many years and one that has been attacked from various angles. The present investigation was a study of the changes taking place in the quality of flour gluten during the process of ageing. Samples of flour—three weak and three strong—were stored for three months at 15°, 30° and 45° C. The flour stored at the higher temperature showed a very sharp change in gluten quality within two months. At low temperature practically no change was observed. As the result of ageing, the weak flour became nearer in gluten quality to that of the freshly milled strong flour. During the storage of flour at a high temperature there was observed a considerable rise of titratable acidity as well as an increase in the acid number of fat. The removal of fat from the aged flour by ether extraction brought the gluten back to its original quality, thus "rejuvenating" it. Apparently the direct cause of change in gluten quality is due to the accumulation of free fatty acids in the flour caused by a process of fat hydrolysis. The oxidation of flour pigments that takes place during ageing has no connection with the change in gluten quality.

A Test for Vitamin C

Tauber (*Mikrochem.*, 1935, vol. 17, p. 111) has recently worked out a sensitive spot reaction for ascorbic acid which appears to be very useful in vitamin C assay. The reagent consists of three components—acetic acid; a solution containing ferric sulphate, phosphoric acid and potassium permanganate; and a solution of potassium ferricyanide. There should be no trace of blue colour when equal volumes of these three solutions are mixed. To detect ascorbic acid in plant tissues or organs a few grams are macerated with hot acetic acid and a drop of the extract placed on a double filter paper; and the spot on the lower paper is treated first with the ferricyanide reagent and then with the second solution. In presence of 0·003 mgm. of ascorbic acid a blue colour appears within half a minute. With more than 0·005 mgm. the colour shows immediately. If no colour appears within one minute, absence of ascorbic acid may be concluded. After a longer time certain tannins may reduce the ferricyanide and thus show a blue reaction.

The Odorous Onion!

We all know the saying that an apple a day keeps the doctor away; but a spring onion keeps everyone away! The problem of the persistence of an alliaceous odour in the breath after eating onions or garlic has recently been receiving the attention of the laboratory of applied physiology at Yale University, where Haggard and Greenberg have been investigating the problem. It is generally supposed that, like ether, alcohol and acetone, the essential oil of the onion passes into the blood stream and is aerated from the blood in the lungs. Other possibilities are that the oils are secreted into the saliva or that the smell comes from the stomach by way of the œsophagus. Haggard and Greenberg have, however, other views. They have found that when garlic was taken chopped in small particles but enclosed in gelatin capsules there was no smell detected in the breath, except once, when the subject was ill for three hours after his dose. The results go to show that the continuing smell of onions or garlic in the breath arises solely from particles retained in the mouth. These cannot be completely removed by mechanical means, but it has been found that, if the mouth is rinsed with a solution of chloramin, chlorine is liberated and the offending odour is completely removed. So now we may be in a position to enjoy our spring onions without announcing the fact to all and sundry for the next twenty-four hours!

The Cook and The Calorie

Some time ago we referred to a report issued by the Nutrition Committee of the British Medical Association on the minimum amount of food necessary to keep a man in full working capacity. Calculations were made and the total costs of so many calories, so much protein, carbohydrate, and fat were computed, and when all due corrections were made the B.M.A. solemnly announced that a man could live healthily on 5s. 10½d. a week. This raised a good deal of controversy—a regular storm in the teacup—and the Ministry of Health carried out independent calculations and said that the B.M.A.'s estimate was 1s. 0½d. too much! The matter was not allowed to rest at that, and the B.M.A. has now returned to the fray with a counter-attack on its critics. A new type of cookery book has been issued at the modest price of 6d., called *Family Meals and Catering*. In it an attempt is made to make calories and proteins look less inhuman, and these cold chemical compounds are now depicted as delectable dishes—calories in colour, one might say. Things are indeed moving. Not long ago the first dietetic consultant appeared in an English restaurant. Now we have witnessed the first appearance of dietetic science in the kitchen as a help rather than a hindrance. The object, it is stated, is to fend off disease by healthy feeding. If the B.M.A. does much more of this, everybody will get so fit that there will be no need for the existence of the B.M.A.!

Another National Mark

The Ministry of Agriculture loves its little game of applying the "Mark". Its scouts are out looking for chances with the blithe enthusiasm of the butterfly hunter. They have discovered all sorts of unexpected articles to qualify for the National Mark, but the latest and perhaps the quaintest is "National Mark Wheat Flakes". "In all cases the wheat flakes shall be sound, free from taint and objectionable flavour, mould and staleness, and shall be made exclusively from sound, well-cleaned wheat grown in England and Wales, and in addition shall have the qualities or characteristics specified below: The wheat flakes shall comprise the whole wheat berry; bran or flour shall not be added to nor extracted therefrom. The colour of the flakes as packed shall be a clear golden toast colour, but the flakes shall contain no added colouring material. The flakes shall be reasonably free from dust and from small fragments." As usual, the specification is the epitome of vagueness. What exactly is an objectionable flavour, and what does "well cleaned" mean? What can be regarded as "reasonably free from dust", and what is a "small fragment"? If the specification had said not less than x per cent. shall overtail a No. y sieve, we should know what it meant. As it is it may mean anything.

Dangers of Shell Fish

Medical investigators have a melancholy habit of finding out that some of our most toothsome delicacies are really poisons in disguise. In France attention has been focussed on the mortality returns caused by the enteric fevers, and recently Dr. G. Dubreuil has subjected these returns (collected by the Bulletin de la Statistique Générale de la France) to a critical analysis. He has concluded that the enteric fevers are more common in seaboard than in inland areas and that the *fruits de la mer—i.e.*, shell fish and the like—are far and away their most serious cause. Dr. Dubreuil goes on bitterly to say that "the comparatively small communities living on the sale of these 'fruits' are at present disregarding public health measures at the expense of vast numbers of consumers who pay with their lives for the immunity enjoyed by the minority". The figures for the seven-year period 1925-31 show that the average annual death rate from typhoid and paratyphoid fever throughout France was 4·8 per 100,000. The department of Bouches du Rhône heads the list with 16·2 deaths per 100,000. Of the 23 departments with a typhoid mortality above the average, only 7 were inland, and of the 66 island departments as many as 57 had a typhoid mortality below the average. After due credit has been given to defective drainage and water supplies, milk and its products, raw fruits and vegetables as causes of the enteric diseases, Dr. Dubreuil still comes back to the unfortunate crab, lobster, scallop, and the common shell fish, such as cockles and mussels, as the crux of the problem.

Fruit Trade

The Imperial Economic Committee has recently issued a summary of figures relating to trade in certain fruits. From it we find that world trade in fruit has expanded considerably since the war, but the demand for oranges and bananas has increased much more than that for apples and pears. In the case of canned fruits there has been a steady increase since 1930, but the high level of 1929, when the United States experienced her bumper year, has not since been reached. The unexpected fact emerges that the British Empire is an importer of all fruits dealt with in the review, with the possible exception of bananas. This is, of course, due to the heavy imports into the United Kingdom and Canada, which more than balance the Empire production. The questions of import duties and trade restrictions are dealt with, and apparently by the end of 1932 no country in Europe permitted unrestricted imports of all fruits.

Canned Fruit

Our readers are probably more interested in canned fruit than fresh, and they will find much of interest in the publication referred to above. Fruit is canned in a large number of countries, but there are no statistics available for many. It is probable that the United States and Hawaii provide the bulk of the world aggregate and account for more than the rest of the world put together. In the British Empire, Australia and British Malaya (pineapples only) are the most important producers, but the output of Canada and South Africa is growing. The principal fruits canned in the world are apricots, peaches, pears, pineapples, and grapefruit, but in the United Kingdom and Continental Europe there is a considerable pack of soft fruits such as raspberries, strawberries, etc. The products of the European canning industries do not play any real part in international trade. The average importation of canned fruit into the United Kingdom works out at over $2\frac{3}{4}$ million hundredweights with an average declared value of nearly £6 million. There is evidently plenty of room for home expansion in the canning of such fruits as can be produced profitably.

NEW METHODS *of* MANUFACTURING
Cream Cheese

By J. C. Marquardt, New York Agricultural Experiment Station, Geneva, New York (U.S.A.)

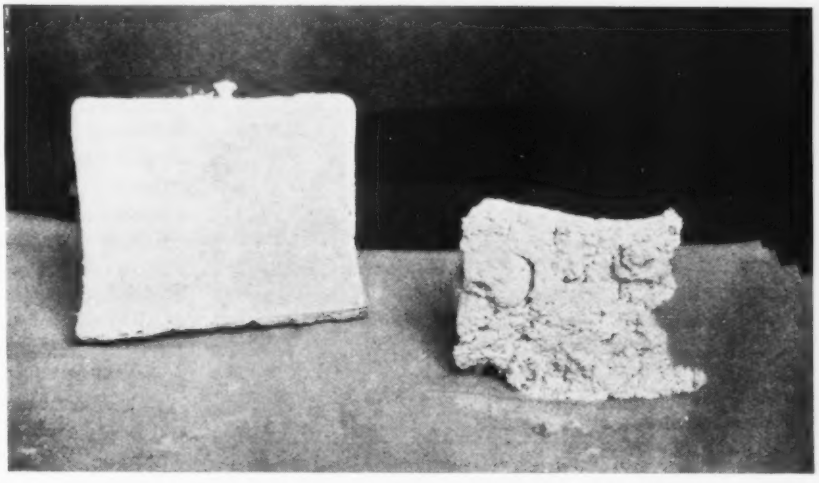

FIG. 1.—The Old and the New in Cream Cheese. Note the smooth, compact texture of the Geneva type cheese shown on the left. The other sample represents the rough type of cream cheese frequently produced by the modified Neufchatel method when the time, acid and rennet balance is disturbed.

The information given in this valuable article opens up a new field of enterprise to British food manufacturers. At least half the cream cheese produced in U.S.A. is now being made by this method.

AFTER WE do a task by a given method for many years we assume that other ways of doing it are not possible. Thus, in converting certain fluids into solids, unaltered practices have been used for centuries.

About ten years ago the scientists at the New York State Agricultural Experiment Station decided that a simple and more modern method should be available for producing cheese curds. Curds have always been produced by rennet or by souring. The Geneva (New York) experiments utilised pressure for curd formation—a very important discovery in the making of cheese, but of greater importance to the food industry generally.

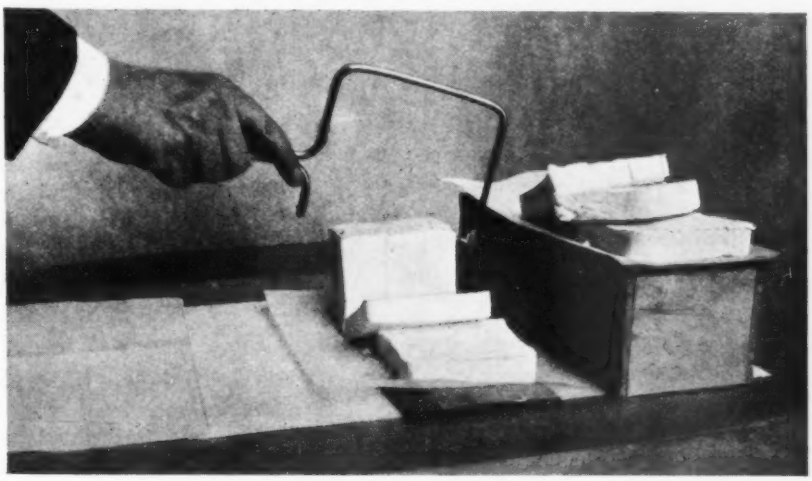

FIG. 2.—Geneva Type Cream Cheese. Note the excellent slicing qualities of this new product.

In 1920 the production of cream cheese in New York State was 4,000,000 lb. annually. The yearly production reached 10,000,000 lb. in 1926. At this point it became evident that this growing industry could no longer use the rule of thumb in making the cheese by the modified Neufchatel method. So the Geneva Station set about to develop a method that would permit of large-scale production. The result was the development of a method that produced better texture and flavour; and it was more sanitary than the old method just mentioned. The improvement of cheese made by the Geneva method over the old style cheese is shown in Fig. 1. The excellent texture and slicing properties of the Geneva type cheese are shown in Fig. 2.

In 1927 a patent was issued to the station and assigned for public use. It embraced the fundamental principle of coagulating cream by pressure. Cream cheese manufacture in New York State increased from 10,000,000 lb. in 1926 to 21,000,000 lb. in 1931. It requires annually an added amount of 4,000,000 lb. of milk fat in New York State. The new method is largely responsible for this increase. The influence of the introduction of the Geneva method is graphically shown in Fig. 3.

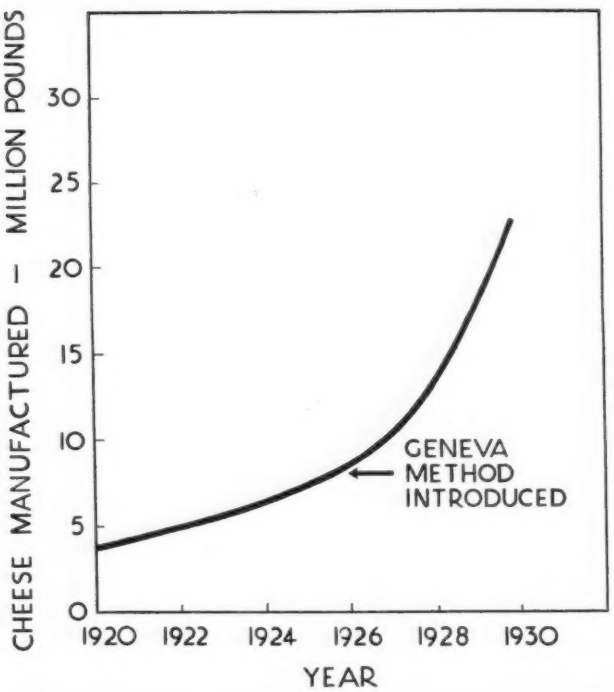

FIG. 3.—Production of cream cheese by New York plants, as reported by the State Department of Agriculture and Markets, showing increased production after introduction of Geneva method.

The new method, as previously stated, embraces a new principle. The high pressure combined with the high fat content produces a very complete fat clumping and protein coagulation, but the significance of protein coagulation was not fully recognised until the work of Doan* showed that a tendency toward protein coagulation was induced by ordinary homogenisation of ice-cream mixes and cream. It is probable that the primary effect is protein coagulation; but protein coagulation is produced by the combination of fat and pressure. In other words, skim-milk homogenised under similar conditions does not coagulate to any appreciable degree.

In the original new process cream cheese was made which was cultured to give the usual acid flavour. The process consisted in the addition of 3 to 7 per cent. of dry skim-milk to sweet cream testing 40 to 42 per cent. of milk fat. These added serum solids assisted in the elimination of leakage of whey from the cheese, tended to reduce the very rich flavour, and gave additional firmness to the body. From 0·5 to 0·7 per cent. of a finely ground pure food agar and 0·7 per cent. of salt were then added to the cream. The agar was free from odour and flavour and dissolved readily. Ordinary agar, like that used in laboratories, was not satisfactory. A finely ground agar, like ground gelatin, mixed readily with the cream and tended to lump less than the dry skim-milk, which was added slowly while the cream was rapidly agitated. Pasteurisation at 180° to 185° F. for 5 or 10 minutes dissolved the agar or softened it sufficiently for homogenisation to complete the solution. The cream mixture was then cooled to 110° F., and, after adding from 0·5 to 1·0 per cent. of starter, was homogenised at 3,000 to 4,000 lb. pressure. The mixture should leave the homogeniser with the consistency of soft butter or ice-cream being drawn from the freezer and should be immediately placed in the final package. The cheese was then incubated at 70° F. for 15 to 24 hours to develop an acid flavour, cooled to 40° F., and held at that temperature. As mentioned in the original publication, this cheese developed a rather high acidity for cream cheese, but cream cheese as now made has a higher acidity than in former years.

Recently this method has been used to develop cream cheeses of various flavours, and it appears to be especially well adapted for this purpose. Except for acid cheese, the cream and cheese mixtures of various flavours were homogenised at 140° to 180° F., thus making it possible to place the very hot cheese directly into packages. In making cream cheese flavoured with Roquefort, about 15 per cent. of Roquefort cheese gave a pronounced flavour. From 20 to 30 per cent. of well-ripened cheddar cheese gave a good cheddar flavour to cream cheese. For either of these cheese flavours, the cheese to be used was cut into small pieces or slices and added directly to the cold cream mixture. Pasteurisation softened and dissolved the cheese in the cream while homogenisation insured a product with very uniform distribution of the cheese. No commercial starter was employed.

For cream cheese flavoured with sweet pickle relish, olives and nuts, pimento, etc., the finely ground flavouring materials were added to the cream cheese immediately after homogenisation. Generally about 20 per cent. of the flavouring materials proved to be ample. These cream cheese products made without starter had excellent keeping qualities, as they were packaged while at 160° F. or above. In some instances, especially to prevent cracking of the cheese in glass containers, the cheese has been packed at 120° F. The addition of serum solids also aids in preventing cracking or whey drainage.

Detailed Directions for 100-lb. Batches

Acid Flavour

Add 5 lb. of dry skim-milk to 93 lb. of sweet cream testing 40 to 42 per cent. milk fat. Then add 0·5 lb. of ground agar and 0·75 lb. of salt. The cream should be well agitated as the dry skim-milk and agar are slowly added. Pasteurise at 180° to 185° F. for 5 minutes. Cool to 110° F. Add 0·75 lb. of commercial starter. Homogenise at 3,500-lb. pressure, using no strainer in the intake pipeline. The homogeniser should have been previously run with water at 160° F. or above. Place the cheese immediately into the final package. Chill in a refrigerator at 40° to a temperature of 70° F. and incubate for 12 to 24 hours to develop an acid flavour. Then chill to and hold at 40° F.

The acidity develops slowly, and the rate of development is controlled by the percentage inoculation. Reducing the skim-milk solids to 3 per cent. tends to soften the body of the cheese and increases the tendency towards some whey drainage and lower total acidity. The cheese may be softened by decreasing the homogenisation pres-

* *Jour. Dairy Sci.*, 14, 527-539. 1931.

sure to 3,000 lb. or firmed by increasing it to 4,000 lb. More than 1 lb. of salt will retard, and 1½ lb. almost check acid development. Cream colour may be added before pasteurisation, if desired, and it has the special advantage of reducing the intensification of colour of cheese exposed to the air.

Consideration has also been given to the omission of starter and the securing of the desired acid flavour from Neufchatel, cottage, or Neufchatel cream cheese. The process itself presented no special difficulties (even cottage cheese could be homogenised in the cold or warm cream at 3,000 lb. pressure), and the mixture was treated in the regular way. About 50 per cent. of this acid cheese is required to impart a very mild acid flavour to the finished product; or a product such as that made from an enriched milk by the cottage cheese process could be homogenised alone. The process is somewhat complicated and the flavour of the finished cheese is very mild, but it has excellent keeping quality.

The homogeniser may be a source of microbial contamination and may chill the first material passing through it. For these reasons the hot water rinse just before use is always essential. The cream mixture was strained through a coarse strainer with approximately $\frac{1}{16}$ in. openings, and the strainer to the homogeniser was always removed from the pipeline to permit an even flow of the cream mixture. Short pipelines are very desirable to reduce mechanical losses.

The hot cheese may be transferred with a filling machine or by hand to 3- or 5-lb. lined boxes for bulk sale. The usual mayonnaise jar-filling machine can be used for filling jars, but some difficulty may be encountered in making the small tin-foil or transparent cellulose-wrapped 1- to 4-oz. packages. These packages are made from the cold cheese by moulding into proper size with a machine or by cutting into the proper size with a remodelled butter cutter. Some ingenuity must be used in the details of placing the cheese in the package.

Ripened Cheese Flavour (Cheddar and Roquefort)

Add 5 lb. of dry skim-milk to 69·25 lb. of sweet cream testing 40 to 42 per cent. of fat. Then add 0·75 lb. of common salt. (The agar is not essential in this cheese, but it improves slicing qualities.) The cream should be well agitated as the dry skim-milk is slowly added. Remove paraffin, cheesecloth, or other coating from the surface of 25 lb. of well-ripened American cheddar cheese and grind or slice the cheese. Cheese colour appears to be desirable for cream cheese of the cheddar flavour to give the cream the usual cheddar cheese colour.

For Roquefort flavour use 79·25 lb. of sweet cream, 5 lb. of dry skim-milk, 15 lb. of Roquefort cheese, and 0·75 lb. of common salt. The entire mixture should be pasteurised at 160° or at 180° F. for 5 minutes, depending upon the keeping quality desired. Homogenise at 3,500-lb. pressure, the machine having been previously run with hot water. Place the hot cheese directly into the final package and immediately store at 35° to 40° F. in the refrigerator.

Less Roquefort cheese is generally required as a flavour than is the case for American cheddar. Many persons who object to the flavour of Roquefort cheese consume large helpings of Roquefort cream cheese. Other varieties of cheese may be used, but investigations have been limited to the two varieties mentioned.

The ripened cheeses readily soften and disperse in the cream when the temperature exceeds 145° F. No necessity for using an emulsifying salt was ever encountered, but tests demonstrated that these salts, such as di-sodium phosphate and sodium citrate, could be used in limited amounts without interfering with the process.

Other Food Flavours

Coarsely ground sweet pickle relish (onion flavour is undesirable), pimento, olive and nut, pineapple, and other food flavours may be used. Add 5 lb. of dry skim-milk, 0·5 lb. of ground agar, and 0·75 lb. of salt to 73·5 lb. of cream testing 40 to 42 per cent. of fat. The cream should be well agitated as the dry skim-milk and agar are added. Pasteurise at 180° to 185° F. for 5 minutes. Homogenise at 3,500-lb. pressure, the machine having been previously run with hot water. Stir the flavouring material (20 lb. is about right for most foods) directly into the hot cheese. Place in the final package and store immediately in the refrigerator at 35° to 40° F.

In some instances there may be an excessive quantity of juice. This can be mixed in the cream just before homogenisation, but if the acidity of the juice is high, the cream mixture may be previously cooled at 120° to 140° F. before adding the juice and the homogenisation pressure reduced to prevent excessive fat clumping and coagulation. If the body is somewhat soft, the dry skim-milk may be increased to 7 lb.

Most fruit flavours did not blend well with cream cheese, but tart spicy flavours were generally satisfactory.

The method has been introduced mainly by companies who send representatives to the station for demonstration. More than sixty manufacturers have studied the method at Geneva. It is conservatively estimated that 50 per cent. of the cream cheese now being produced in the United States is made by this method.

English manufacturers supplying the London market have requested directions for the new process. The formula and discussion herein should be sufficient to meet their needs. Further detail can be obtained by writing to the author. Or a copy of the patent may be obtained by sending the equivalent of 15 cents in our money to the U.S. Patent Office, Washington, D.C. The patent number is 1661601.

Initial trials should always be made with small batches. This can be achieved by attaching a small supply can directly to the homogeniser.

The principle allows for additional types of products. The ingenuity of the manufacturer to apply them is the only requirement.

This article contains a valuable table (see next page) giving analyses of various cream cheese, cream cheese spreads, cream spreads and process cheese. The values are taken from the file of the author. The samples were representative, since they were collected at random throughout the United States.

TABLE SHOWING THE PERCENTAGE COMPOSITION OF VARIOUS CHEESE OF A SOFT CREAMY CHARACTER WHICH POSSESS SOME COMMON CHARACTERISTICS AS TO TYPE OR PACKAGE AND WHICH ARE CLASSIFIED ACCORDING TO LABELS OR ACCORDING TO KNOWN TYPES REPRESENTED.

Composition.	*Cream Cheese.*			*Cream Cheese Spreads.*			*Cream Spreads.*			*Process Cheese.**		
	Min.	*Max.*	*Av.*	*Min.*	*Max.*	*Av.*	*Min.*	*Max.*	*Av.*	*Min.*	*Max.*	*Av.*
Moisture	50·5	58·5	54·50	55·0	59·5	57·00	45·80	62·20	54·16	36·00	51·00	42·56
Fat	30·0	40·0	35·33	22·5	37·0	32·25	17·00	26·50	23·33	21·00	30·00	25·20
Protein	5·60	7·70	6·83	5·10	7·10	5·70	5·20	12·90	8·56	20·40	24·40	22·20
Sugar	0·80	1·49	1·25	1·10	4·24	2·78	4·27	9·90†	6·31	5·24	8·62	6·68
Salt	1·00	1·20	1·13	1·00	1·80	1·40	1·40	2·70	2·13	1·30	1·70	1·50
Acidity‡	0·70	0·80	0·75	0·80	1·00	0·87	0 90	1·20	1·10	2·10	2·40	2·25

* Some samples were labelled as containing added water.

† One sample of pineapple cream spread contained 15·83 per cent. of sugar, and this result, being abnormally high, was not included in the average.

‡ Expressed as percentage lactic acid. Titrations were made with N/10 NaOH, using phenolphthalein as indicator.

FACTORS AFFECTING THE SOLUBILITY OF MILK POWDERS

By G. R. HOWAT and N. C. WRIGHT

THE CONFUSED opinions held with regard to the effect of the process of manufacture on the solubility of the protein of milk powders have induced the authors to make a thorough investigation into the effect of heat treatment on the ultimate solubility of dried milk, and especially on the solubility of milk powders.* In the experiments the widest possible variations in both temperature and concentration of milk solids have been investigated, the former varying from 15° to 100° C., the latter covering a range from 8 to 87 per cent.

The conclusions reached may be summarised as follows:

1. If the temperature of heating is kept constant, an increase in the concentration of milk solids will cause a marked reduction in the time required to produce a given degree of protein insolubility. Thus at 100° C. and with a solution containing 8 per cent. of milk solids, it requires about 7½ hours to render 50 per cent. of the protein insoluble, while for a solution containing 30 per cent. solids the time required is about 30 minutes; for 60 per cent. solids, 30 seconds; and with 88 per cent. solids, about ½ second. This observation is particularly significant in relation to atmospheric roller drying. It is, in fact, universally recognised that atmospheric roller-dried powders possess a poor solubility.

2. If the concentration of milk solids is kept constant while the temperature is varied, it is found that the time and temperature required to produce a given degree of insolubility exhibit a logarithmic relationship. This is of particular interest in connection with the effect of time and temperature of heating on high concentrations of milk solids. It has been frequently observed that milk powder exposed to a moist atmosphere rapidly absorbs water and that the protein becomes insoluble. As mentioned above, the protein of roller-dried milk powders is insoluble. It appears from the tests that the fundamental reactions governing both conditions of protein insolubility are identical. The protein insolubility, induced either by manufacture or by storage, appears therefore to be due solely to the combined influence of time and temperature of heating: in the former it is caused by momentary heating at a high temperature, and in the latter by prolonged storage at a low temperature. These facts demonstrate the profound influence of time and temperature of heating, and in particular of the concentration of milk solids on the production of protein insolubility in milk powders.

Other experiments were made for the purpose of investigating the effect of heating milk powders in a dry state, since in both roller and spray drying there is the risk that such heating will occur during commercial manufacture. Experiments have shown that a logarithmic relationship exist between the temperature and time required to induce this type of insolubility due to the alteration of the solubility of the casein, the rate of reaction increasing over sixfold for each rise of temperature of 10° C. While at 100° C. the casein is rendered 50 per cent. insoluble in 10 hours, at 129° C. about 3 minutes and at 139° C. only 40 seconds are necessary.

As to the practical conclusions to be drawn from the foregoing, samples of milk powder were reconstituted under standard conditions at temperatures varying from 20° to 100° C. The results showed clearly—

(*a*) that the maximum percentage of insoluble protein is found in samples reconstituted at 20° C.;

(*b*) that the percentage of insoluble protein decreases progressively as the temperature of reconstitution is raised to 50° to 60° C.; and

(*c*) that between 50° and 100° C. there is a slight but definite increase in the percentage of insoluble protein.

The increase in the percentage of insoluble protein between 50° and 100° C. is probably due to the effect of the temperature of reconstitution itself and is not directly attributable to the process of manufacture.

* This article has been abstracted from a paper presented by Howat and Wright to the World Dairy Congress held at Rome and Milan in May, 1934.

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DRIED MILK

By HAROLD SILMAN, B.Sc., A.I.C.

THERE ARE so many different types of powdered milk prepared by a variety of methods, each having its own particular qualities, that a knowledge of them is necessary to almost everyone engaged in the food industry. The field of application of this type of milk is very wide and ranges from bread-making to the manufacture of canned soups. It has the advantages of cheap transportation charges and good keeping qualities, so that all milk-using processes are directly interested in its development. Average whole milk has a water content of 87 per cent., therefore the saving on freight alone needs no emphasis.

The chief difficulty in the early days of milk desiccation was the poor solubility of the product, and the first improvement consisted in adding sodium carbonate to act as a casein stabiliser. Modern methods have entirely different principles from those originally used, and powders now have a high degree of solubility without the presence of mineral additions. There are three commercially practicable methods of manufacture: (1) Dough process; (2) roller process; (3) spray process.

The Dough Process

The first process (which has now been to a very large extent superseded) consists in heating the milk in open pans under agitation, or in a vacuum, until it becomes a highly concentrated dough. This is then spread out, dried in a current of hot air, and finally powdered and sifted. The addition of a small proportion of sugar helps the final granulation of the dough and aids in the removal of moisture towards the end of the process.

Roller Process

The milk in this method is run on to the surface of steam-heated revolving drums in a thin film; a scraper automatically removes the dried milk as it forms. The conveyance of the milk to the roller surface may be done by allowing the roller to dip into the liquid milk at its lowest side or by allowing the milk to drip directly on to the drums. Two drums are sometimes arranged to revolve together in close contact and the milk is retained in the trough formed between them. It is obvious that the large proportion of water present means that the drums must revolve slowly and that their capacity is strictly limited. It is therefore highly advantageous to condense the milk partially before applying it to the rollers, and this is now done to a very large extent.

When the dried milk is intended for human food it is important to have a highly soluble substance, and if the drum-drying process is carried out under atmospheric pressure a comparatively high temperature will be necessary. This will affect the casein and impair the solubility. Many processes therefore enclose the drums in a vacuum and carry out the operation much more rapidly and at a lower temperature. The drums may be kept at a moderate temperature either by hot water or, better still, by steam under reduced pressure inside them. By precondensing the milk to one-fourth of its volume a greater economy of working is achieved, and, furthermore, the powder produced is heavier in nature so that it is more readily packed for transport.

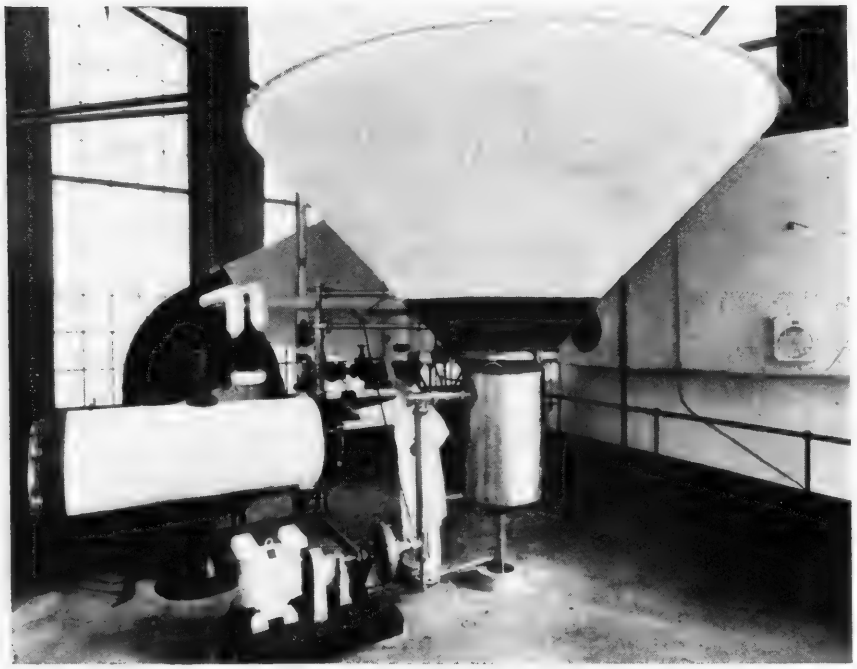
Spray Process

In this method milk is sprayed into a hot chamber through which a current of air passes and the droplets become desiccated and fall on to the sides and bottom of the chamber in tiny particles. The air must be kept moving rapidly to obtain the maximum drying effect, and most systems allow the hot air which passes out of the chamber to precondense the liquid milk by blowing it through a preliminary milk spray. Precondensed milk allows of a more rapid output and gives a superior product. The spray may be stationary or revolving; in some cases it is produced centrifugally by letting the milk flow on to a rapidly revolving disc.

Special precautions must be taken to collect the milk dust and to prevent it being blown out with the escaping hot air, otherwise serious losses will result. This is best done by directing the incoming air so that it first comes into contact with the milk spray at its driest stage and passes into the less dry milk, finally escaping near the point where the spray enters the chamber. In some cases a system of filters is used, but these are very troublesome and best avoided, correct direction of the air giving equally good results. In the best modern methods arrangements are made for the immediate removal of the dried milk from the chamber by a system of travelling belts, since prolonged exposure to the hot atmosphere decreases the solubility; it also affects the keeping quality generally, besides having a deleterious effect on the vitamins.

Heat Supply

In practice, at a low temperature, a much greater amount of heat is needed to evaporate a given quantity



A view of the lower part of the Liquid Collector of the Grey-Leuson Spray Process Drying Plant installed at the works of the Scottish Milk Produce Co., Ltd., at Kirkcudbright. The Sanitary Milk Pump and the Milk Heater are on the left. The milk is first pasteurised and concentrated by spraying into the liquid collector, and then forced at high pressure through the atomiser into a drying chamber.

of water by means of hot air than is required when the temperature is higher. It is, therefore, desirable to work at as high a temperature as is consistent with good properties in the finished article. The usual temperature of the incoming air is somewhere about 270° F., but in some processes a temperature as low as 160° F. is employed. The quantity of air necessary will also vary with its initial humidity, and the apparatus must permit this being changed as required. In cold weather less air will usually be needed than in hot weather because of the lower moisture content. Also when the barometric pressure is high the amount of air required to effect the same degree of drying is decreased. The air leaving the chamber should be at from 120° to 200° F. in order to ensure that it will not redeposit the moisture which it holds.

In heating the air for the drying chamber care must be taken that it does not become contaminated by dust or impurities, and open-fire heating is inadvisable. Steam coil pipes are good and give a uniform temperature. The air is occasionally filtered before admission to the chamber, but in the majority of cases it is not. The drying chamber is often about 12 by 20 ft. with a height of some 25 to 30 ft.

As the particles fall it is necessary that they should come into contact with progressively drier air, so that it is best that the heated air should be admitted near the bottom and pass upwards to meet the milk spray entering near the centre of the chamber. The latter should be well lagged with asbestos and lined either with good tinplate or, better, with glazed tiles. Various types of sprays may be used, working at pressures of from 2,500 to 3,000 lb. They require periodical cleaning, since they tend to become clogged.

Yield

In the spray process, using skimmed milk, a yield of from 8 to 9½ lb. of dried milk is obtained per 100 lb. of liquid milk, and the amount of loss can be ascertained, knowing that average skimmed milk contains about 9 per cent. of milk solids.

In the roller process the loss is practically negligible. On the other hand, it contains a higher percentage of

The Dried Milk Powder from the Grey-Leuson Spray Process Plant illustrated above, being discharged from the Powder Hopper on to the sifter and thence into paper-lined containers.

This photograph shows the upper portion of a Kestner Spray Drier used for the production of powdered milk and milk foods. The pipe leading from the air heater to the fan and from the fan to the air distributor at the top of the chamber are in the foreground. Such plants are in use in this country and in Germany and Switzerland as well.

moisture. Spray-dried milk contains 1 to 3 per cent. of water, while the roller-dried product may contain from 4 to 7 per cent.

Solubility of Milk Powder

The solubility of a milk powder in water is not an easy matter to compute practically. It is a complicated process and involves a combination of solution, suspension, and emulsion, but in the present discussion, to avoid undue complication, the powder will be considered as "dissolved" when it gives a liquid filterable like ordinary milk. The solubility will depend upon the quality and acidity of the fresh milk and upon the details of the drying process. In particular the presence of lactic acid or rennin-forming bacteria in the liquid milk will lower the solubility of the powder.

Above 150° F. the albumen in the milk is coagulated, and here the advantages of the vacuum-drying method become apparent. Unheated milk contains calcium, combined mainly in the form of calcium caseinate, and any degree of heat will precipitate free casein. The casein is colloidal and will readily re-emulsify with water, provided it has not been exposed to too high a temperature, as this destroys its colloidal form. The precipitated mineral matter, chiefly calcium phosphate, is left as a very slight insoluble deposit. It is found that spray-process milk, provided it is not heated above 150° F. before desiccation, gives an almost completely filterable solution in cold water. If the milk has been heated to boiling-point at any stage in the process a solubility of only about 90 per cent. results, which is increased to 95 per cent. on boiling with water.

In the case of the roller process, 60 or 70 per cent. of the powder will give a filterable solution in cold water and about 80 per cent. in hot water at 210° F. The vacuum process gives a much better result, about 97 per cent. of the powder going into solution in hot water. Experiment shows that the solubility is proportional to the solubility of the protein constituents of the dried milk, and it is probably the condition of the protein which ultimately influences the solubility of the whole product.*

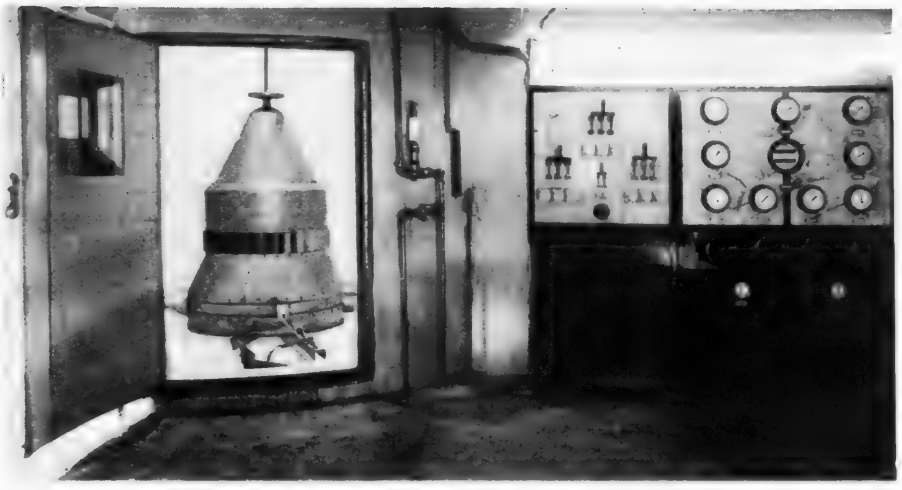
In this photograph is shown the lower portion of the Kestner Spray Drier illustrated above, the conical portion of the separator being in front and a dust separator behind. A conveyor is usually fitted at the outlet to carry away the powder.

(By courtesy of the Kestner Evaporator and Engineering Co., Ltd.)

Age and Solubility

The degree of solubility gradually decreases in course of time. This is apparently due to the effect of moisture on the milk

* For other views on the question of solubility reference should be made to Howat and Wright's paper summarised on page 346 of the present issue.



The Drying Chamber of a Krause plant for the making of milk powder. It is lined with special tiles and the atomiser disc is driven through a vertical shaft at high speed, so that the precondensed milk fed from a central pipe is broken up into a fine mist. The powder is discharged continuously, by revolving rakes.

(By courtesy of Hugh Griffiths.)

protein which causes it to lose its power to re-emulsify with water. The excessive moisture can be introduced either from the atmosphere or may originally be present in the powder. Dried milk must be carefully stored in tightly closed containers, and if the moisture content is kept below 3 per cent. the original solubility of the casein will remain unaltered for a year or more. Increase in the moisture content results in a progressive decrease in solubility in course of time.

Speed of Solution

For some purposes the rapidity with which the powder dissolves is of importance, and this is not necessarily dependent on the actual solubility. Clearly, a finer powder will dissolve more readily than a granular product, and spray-process milk is generally finer and more flaky in nature than the roller-dried form. Beyond a certain point, however, a too fine powder becomes a disadvantage, since the particles will then be excessively mobile and coalesce together to form flocks. The rapidity with which solution commences on the minute particles will make their surfaces very sticky, and they will cohere together so strongly that the subsequent speed of solution will be considerably decreased.

In roller-dried milk the particles are more granular, and this difficulty does not occur, neither is it experienced when a coarse spray is used. The aim of the manufacturer should be to work with a spray of relatively large orifice under low pressure to produce a granular powder of an average diameter of 150 microns. The drying speed will, of course, be reduced by a large orifice, but if the milk is precondensed, a small spray may be employed to give a product similar in nature to that obtained using ordinary milk and a larger orifice.

Composition

The composition of a milk powder will depend largely on the quality of the milk used and on the amount of moisture it has absorbed, since the substance is very hygroscopic. Analyses of a few of the commonest types of milk powder generally obtainable are shown, in percentages, in the table at the foot of the next column.

Keeping Qualities

Research in recent years has greatly reduced the tendency to staleness and rancidity to which milk powders were formerly prone. The tendency to deterioration is especially marked in whole milk powder, and even with these great progress has been made. Special attention is paid to packing, since airtight and moisture-proof packages will enable the powder to retain its freshness for a considerable time.

The lower the moisture content of the milk, the less tendency will there be for bacterial development, since water is necessary for bacteria to thrive. Proper desiccation and storage are necessary to prevent faults of bacterial origin. There does not appear to be any direct relation between the bacterial count of the original milk and that of the final product, although there is some difference of opinion on this point. Contamination in the course of handling and packing is probably a very common cause of excessive bacteria in the milk powder. The number of bacteria decreases rapidly with age, due presumably to the absence of sufficient moisture for growth and reproduction. Condensing before drying greatly diminishes the number of bacteria, and the roller process gives better products in this respect than the spray process. From the welter of conflicting opinion on the whole subject the following facts are well established.

1. Roller processing of milk completely destroys, or renders non-virulent, non-sporing bacteria—*e.g.*, tuberculosis.

2. Spore-bearing bacteria are destroyed, but their spores are only partially affected.

3. In spray process milk the above conclusions hold, but to a lesser extent.

Powder.	*No.*	*Water.*	*Butter Fat.*	*Protein.*	*Milk Sugar.*	*Ash.*
Whole milk	I	1·5	28·2	26·67	37·88	5·75
	II	4·74	29·16	26·66	32·24	5·63
Part skim milk	I	2·12	14·20	32·26	44·41	7·01
	II	5·00	15·12	33·30	39·70	6·90
Skim milk	I	1·72	1·15	35·01	52·24	8·03
	II	2·40	1·35	37·70	49·94	8·21
Cream ...	I	0·56	71·15	11·12	14·74	2·43
	II	0·66	65·15	13·42	17·86	2·91

Staleness

On keeping for a length of time, all milk powders develop a stale odour and taste which appear to depend largely on the moisture content, initial or acquired. Low temperature storage retards this, but too low a temperature (below about 40° F.) results in a musty flavour. The changes appear to be due to deterioration of the protein, and are avoided by storing in airtight containers at a moderately low temperature.

Rancidity

Rancidity becomes apparent chiefly in whole milk powders having a high percentage of fats, but since all powders have a certain fat content, the danger exists in every type of product. Rancidity is not due to bacterial action in the finished article because the low moisture content inhibits their growth. It is considered to be due largely to the presence of fat-splitting enzymes, such as lipases, present in the milk before manufacture. Enzymes are not dependent on the presence of water for the continuance of their activity. The temperatures generally employed in roller drying are high enough to destroy the enzymes, so that this type of milk powder shows little tendency to rancidity. The heating of the milk in the spray process to a high enough temperature to destroy the lipases is not favoured, because it would adversely affect the high solubility characteristic of powders prepared by this process. The best steps to take consist in the reduction of the time between the collection and treatment of the milk.

Tallowy Flavour

The commonest defect in milk powders is a tallowy odour and flavour which develop with age. This has recently been shown to be due to oxidation of the milk fat in the presence of a catalyst, probably lactose. Although the subject has not been quite settled, it appears that glycolic acid is formed by autoxidation of the milk fat, and it is this substance which is responsible for the odour.

Since the process is one of oxidation, it is clear that airtight packing will help to delay the onset of tallowiness, but the inner globule of air occluded in each dried milk particle provides enough oxygen to enable the oxidative process to continue. For this reason spray-dried powders (especially those centrifugally sprayed) are more prone to the defect than roller-process granules, which do not seem to have an inner air-core. Heat and exposure to light accelerate the production of tallowiness, but milk with a low moisture content is more liable to it than that with a higher humidity. The defect is connected with changes in the constitution of the fat, and a water content of under 2 per cent. appears to make the powder more liable to it. Also the presence of minute traces of copper salts accelerates the oxidation, so that the avoidance of brass in the construction of sprays, etc., is conducive to improved properties in the finished product.

Vitamins

There is a considerable divergence of opinion as to the presence of vitamins in dried milk, but the following conclusions are well established:

1. Vitamins may be retained to a great extent by avoiding too high temperatures during manufacture and by proper packing.
2. Vitamins A and B are only slightly affected by the drying process, but the antiscorbutic vitamin C is seriously affected by most processes, as it is highly sensitive to heat and oxidation.
3. The vitamin content may also decrease on storage through exposure to air. This applies especially to vitamins B and C.

Packing

The most suitable forms of pack for milk powder are airtight and watertight, and preferably insect-proof. Paraffined barrels lined with waxed paper or hermetically sealed tins are best. Cardboard containers are not satisfactory. In some types of powder sugar is added. This protects the milk in a remarkable way from deterioration. About 10 to 15 per cent. of sugar will prevent lumping and staleness and also tallowiness. The milk powder is less hygroscopic, as a film of sucrose seems to form round the fat and casein globules, and protects them from the action of air and moisture. Malt is also used in this way for food drinks, and malted milk appears to be the only form of dried milk which will keep indefinitely.

Applications

Increasing quantities of dried milk are imported into the United Kingdom and a good deal is re-exported in a manufactured form as special infant foods, humanised milk, food drinks, and so on. The accompanying figures show the extent of the trade so far as statistics are available.

IMPORTS.

	1928	1929	1930	1931	1932
Cwts. ...	200,000	280,000	265,000	361,000	327,000
Value ...	£508,000	£807,000	£714,000	£745,000	£630,000

EXPORTS.

	1928	1929	1930	1931	1932
Cwts. ...	20,100	17,400	17,300	13,500	10,800
Value ...	£49,900	£81,200	£83,000	£59,800	£37,500

Whole milk powder produced by modern methods and efficiently packed will keep in good condition for several months, and finds its chief application in the manufacture of milk chocolate, infant foods, and food drinks.

Skimmed milk powder is very cheap and has a high food value. It keeps exceedingly well and is employed in milk bread, canned soups, and in toilet soaps. Canned vegetables and cereals make use of a considerable amount annually.

DATE PRODUCTS

(An Account of Experiments in Iraq)

THERE HAS recently been issued a preliminary report by W. H. Williams on the utilisation of surplus dates, based on experiments conducted in the chemical laboratory at Rustamia, Baghdad. Suggestions are also made for improvements in the packing and storing of dates.

The dates used in this work were of inferior quality and consisted of commercial varieties of Baghdad and Basrah.

In America dates have been classified into two groups, in one of which cane sugar predominates, and, in the other, invert sugar. Probably at an early stage they are all cane sugar bearing, but later in their development inversion takes place to varying extents.

On account of the fact that dextrose sometimes crystallises as the Iraq date dries out and that crystals are often noticed in date syrup after long standing and concentration, it has been suggested that this sugar could be separated. There are, however, considerable difficulties in effecting this in practice.

Date Syrup

The laboratory gave special attention to the question of producing a good commercial syrup. Date syrup is made and extensively used in most date-growing countries. In Baghdad there are numbers of so-called "dibis" factories, which produce the syrup by boiling the dates (usually low-grade mummified Zahidi) in water, expressing the juice by means of presses, and then filtering it through baskets. Afterwards the juice is concentrated in open pans and stored in earthenware vessels. In Basrah the fruit is heaped in mud-walled enclosures and the syrup is pressed out from the lower dates by the weight of those above.

Obviously, the conditions of working are far from hygienic, and the syrup is usually an opaque brownish-black liquid containing much foreign matter, the nitrogenous portions of which give rise to fermentation in quite a short time. Much of the dark colour is extracted from the skins during boiling, but some is due to caramelisation, which also imparts a cooked taste.

Laboratory experiments showed that it was possible to produce clear, light-coloured syrups having a very attractive flavour. A sample which we have on our desk has the appearance and consistency of honey, but has, of course, its characteristic date flavour, which we find most attractive, although some people might consider it too much on the sweet side.

The laboratory procedure consisted in soaking the dates in water overnight and then pressing. The resulting juice, opaque and slimy, was given a preliminary clarification by filtering under suction through a layer of animal charcoal. This was followed by boiling and settling out the nitrogenous matter, and then again filtering. Concentration was effected either in a vacuum or an open pan.

The use of charcoal as a filtering medium seems somewhat old-fashioned. A Seitz filter would be better. Enzymes should be tried for breaking down the colloidal matter, and in this connection, as well as on the whole question of clearing juices, the work of Charley at Long Ashton and of the American workers at Berkeley and elsewhere should be consulted. A trial should also be made with the diatomaceous earth method as applied to

the clarification of honey by the method developed by Lothrop and Paine, of the U.S. Department of Agriculture, described in the August issue of this journal.

Williams suggests that date syrup might find a use as (1) a table syrup; (2) in the baking and confectionery industries—thus, a chocolate syrup has been cheaply prepared; (3) as a basis for drinks and aerated waters; and (4) for the canning of dates and other fruits.

It is stated that date syrup diluted with water lacks flavour and character, but when mixed with orange or other highly flavoured juice and then mixed with water or soda water it forms an exceedingly pleasant beverage. It is also hoped to make a beverage similar to ginger ale by carbonating date extract with ginger flavouring.

One point that should not be overlooked in connection with the nutritional aspect of date syrup is that it is "almost certain" (so says the report) to contain vitamins A and B, whereas honey, it is further stated, is devoid of vitamins.

Vinegar from Dates

In Iraq vinegar is prepared in the household from the sugary extract from dates or from diluted date syrup, and is obtainable in all bazaars. The examples examined were brown opalescent liquids of unattractive appearance from the presence of foreign matter. The acetic acid content is under 3 per cent.

In one experiment a supply of local vinegar was allowed to complete its acetic fermentation, after some fresh sugary liquid had been added, until its acetic acid content had reached about 5 per cent. On distillation this gave a water-white vinegar having an acid content of 4·5 per cent.

It is considered that a good cheap product made from dates would replace the table vinegar now imported into Iraq. A clean, attractive product (whether coloured or distilled) would also undoubtedly find a sale in other Eastern markets.

Cattle Foods

From time immemorial dates and date-stones have been fed to camels and cattle. Williams examined the dried meal from the press-cake—*i.e.*, after removal of the sugary juice—and found that it bore a close resemblance in composition to dried beet-pulp. The crude protein varied from 8·18 to 8·80 per cent.; invert sugar, 17 to 38 per cent.; ash, 2·51 to 2·84 per cent. The sugar content was greatly increased by the addition of the gummy matter separated from the crude juice by the clearing operation.

The composition of the ash is especially interesting. It contains as much as 42 per cent. of potash, 4·5 per cent. of lime, and 7 to 10 per cent. of phosphorus (P_2O_3).

It is suggested that this meal might be compounded with cotton-seed cake or similar by-product of Iraq which are high in protein, to give a product of excellent feeding and fattening qualities.

Date Powder

It was found that the dried date as such was too sticky, on account of its high proportion of lævulose, to be conveniently ground into a fine powder. The difficulty was overcome by removing a small amount of sugar (the liquid extract can be used for vinegar manufacture), and from this date powder a number of attractive food specialities of the breakfast, infant, and invalid variety were prepared. It can be incorporated into cereals, malt, dried eggs, milk, etc. When mixed with a small proportion of coffee it forms a good coffee substitute, and a good chocolate powder was also cheaply prepared. Date flour could also be mixed with wheat flour for cakes, puddings, biscuits, etc.

Date Pulp

There is no difficulty in preparing a date pulp by the ordinary methods. One sample, having a moisture content of about 40 per cent., gave an invert sugar content of about 50 per cent. This is extremely high compared with other kinds of fruit pulp.

Cheap dates, notes Mr. Williams, are utilised in England as a basis for jams. Date pulp made in Iraq could be exported in barrels to be used for a variety of purposes, such as the manufacture of jams, marmalades, butters, sauces, chutneys, ketchups, infants' foods, etc.

Alcohol from Dates

At the present time there are only two alcohol distilleries operating in Iraq—both in Baghdad—and their raw material consists of low-grade Zahdi dates. It is felt that this industry could be considerably expanded and that the carbon dioxide incidental to the process could be utilised for the production of "dry ice".

There is also a field for the production of date wines and liqueurs.

Use of Date Stones

This question has not yet been seriously taken up, chiefly owing to the lack of milling machinery. However, a coffee substitute has been prepared, although the

A Scene in Iraq.

large amount of tannin present imparts a bitter taste. Date stones yield about 8 per cent. of a pungent oil; the properties of this oil should be investigated.

The most obvious use is as a factory fuel or for conversion into charcoal. Not so obvious is the possibility of using them as a raw material for the production of glucose.

Canned Dates

The canning of choice dates is also suggested as a means of extending the market. Few people in Europe have tasted the fresh date, and dates canned in a thin syrup, or in wine syrup, or even dry, would undoubtedly find favour. The fig and prune industries have been revolutionised by the introduction of canning—so why not dates?

Canning is, of course, not the only means of preserving the fruit. One thinks of candied, glacéd, and crystallised fruits; but the invert sugar content would necessitate careful modification of the normal process.

Packing and Storage

It is stated that the dates which fetch the highest price in the English market are those from Tunisia and Algeria daintily packed in long fancy cartons. Each contains about half a pound of dates with a date stalk laid down the centre. Dates are not packed in this attractive manner in Iraq and it would seem that it might be profitable to do so.

The storage of dates in Iraq has always presented difficulties, and it is a question of great importance to the industry. When packing starts in Basrah there are two months of feverish activity. The exporters wish to get their dates out of the country as soon as possible, with the result that foreign markets are soon overloaded and prices drop accordingly. It would therefore be a great advantage if dates could be stored in a fresh, moist condition free from insect infestation.

These are important questions which urgently demand investigation. Little is known about the cold storage of the fruit and the best means of fumigation.

Conclusions

Mr. Williams concludes his report by stressing the fact that it records work of a purely preliminary nature. It has been demonstrated that certain attractive by-products can be prepared, and it is a matter for further investigation to see which of these can be placed on a commercial footing. Something will have to be done immediately if the date industry in Iraq is to be saved from ruin. Mr. Williams makes a plea for an extension of the work which has been started and that facilities for work on a semi-commercial scale, including a cold store, should be provided. He also suggests that central laboratories be built in Basrah where the entire range of difficulties and problems connected with the trade can be properly handled. We entirely agree with this if the money can be found; such a project would be almost certain to pay for itself ultimately.

H. B. C.

THE NEW "PROCEA" PROCESS

At the London Bakers' and Confectioners' Exhibition which was held at the Royal Agricultural Hall from September 7 to September 13, the stand of Procea Products, Ltd., came in for considerable attention. The new Procea process is claimed to be a commercial and economical method of separating starch and gluten from flour, at the same time conditioning the gluten so as to impart maximum extensibility. It can be operated in the usual bakehouse without additional labour, and the improved gluten can then be used in all breads or small goods which require additional lift, a 25 to 50 per cent. increased bulk being obtained, as well as better keeping and cutting qualities and excellent texture.

Two loaves of equal weight, the one on the left containing Gluten separated by the Procea Process, the other being an ordinary white loaf much smaller in size.

This picture shows the elasticity and strength of the Gluten separated by the Procea Process.

Some such novelty seems to be sadly needed to stimulate public interest and revive the declining bread consumption. The idea of using additional wet gluten may well revolutionise the bread trade. It will be interesting to watch the future progress of this novelty.

Some Facts about Butter

By W. L. DAVIES, Ph.D., D.Sc., F.I.C.

(National Institute for Research in Dairying, Reading)

THE MANUFACTURE of butter, which dates from olden times, is a method of preserving the valuable nutritive properties of very perishable liquid milk. Over half the calorific value of milk can be concentrated and preserved for a reasonable length of time by the simple process of churning the cream of milk into butter; moreover, the whole of the fat-soluble vitamins appear in the butter. The quality of milk also has mostly been gauged from its butterfat content and the performance of dairy cows partly from their yield of butterfat. The products from milk after the removal of butterfat are of little relatively commercial importance.

The value of butter as a fatty food rests on its unique nutritive value, with which are associated its chemical composition and vitamin content, its flavour and texture, the comparative ease of its manufacture, its storage qualities, the fact that it is easy to handle and pack, and its ameliorating effect on the quality of other foodstuffs in which it can be incorporated.

Flavour and Aroma

The flavour and aroma of butter (due to diacetyl) add considerably to the price of bulk butter on the open market. Flavoured butter may be 30s. per cwt. dearer than flavourless butter. It is important therefore to stress the conditions which bring about the optimum flavour and aroma properties of butter. This is intimately bound up with the treatment of the cream before churning.

Treatment of Cream

Practically all cream nowadays is separated from milk by using a constant flow centrifuge, the cream separator. By proper adjustment, cream of any desirable fat content from 10 to 60 per cent. can be obtained at will, but, for buttermaking, a cream of 25 to 30 per cent. fat is usually obtained. After separation from warm milk, at 90° F., the cream is not in a proper condition for churning, since the fat globules are still in the liquid state. The cream has to be kept at a cool temperature (40° to 50° F.) for 12 hours and upwards so that the fat exists in a semi-solid condition. This state is essential so as to obtain a firm butter. In the Dominions where cream is neutralised and pasteurised before churning, in order to cause the least effect on the physical state of the fat globule, flash pasteurisation only is carried out, while the cream after cooling to a low temperature (40° F.) is allowed to remain at that temperature for 12 to 16 hours before churning.

Butter Manufacture

Butter may be manufactured from (*a*) sweet cream, (*b*) ripened cream, and (*c*) neutralised cream. The products from (*a*) and (*c*) will not possess a full flavour; that from (*b*) will possess the true full flavour characteristic of butter. Butter made from cream of low acidity—*i.e.*, from fresh or from neutralised cream—keeps better than butter from ripened cream. The explanation of this is given later. The ripening of cream consists in the development of lactic acid in the cream by the agency of lactic acid bacteria. The ripening can proceed by a self-ripening process, in which the cream is allowed to sour naturally by being kept for a few days with occasional stirring. This is sometimes the practice on farms; no control of the ripening is possible by this method, and an inferior butter of low-keeping quality is almost always the result. This is due to actual curdling of the cream in warm weather and the mould contamination of the cream, especially with *Oidium* spp. Artificial ripening is carried out by adding a small quantity of a pure culture of lactic acid bacteria in the form of a "starter" to pasteurised sweet cream and allowing acidity to develop to the right amount. The titratable acidity of the ripe cream should be from 0·30 to 0·40 per cent. (as lactic acid); the acidity of self-ripened cream may be anything from 0·20 to 0·65 per cent.

Sweet Cream Butter

It is advisable when churning *sweet* cream to pasteurise the cream first by warming for an instant to about 175° F. The cream may be quickly brought up to this temperature and quickly cooled. The object of this process is to destroy the lipase which is native to fresh, untreated cream. If fresh cream is churned without pasteurisation the butter will quickly develop butyric rancidity. Happily, such butter is made only on a very small scale and the taint is rare in the commercial product. It must be pointed out, however, that the taint may also follow what is termed "cold dairy" conditions of cream storage before churning.

Cream Ripening

The idea of storage before churning is that lactic acidity may develop; if the temperature of storage is lower than 50° F. the lactic acid bacteria do not grow well, but lipolytic action can proceed apace and split up the butterfat, with the result that the butter is tainted with a butyric off-flavour a few days after manufacture. Control of temperature of ripening in cold weather is essential to overcome this fault.

It cannot be too strongly emphasised that the rigid selection and proper treatment of the cream govern the quality of the butter and the storage properties where such are of considerable importance. The ripening of the cream is necessary (*a*) to impart the desired aroma and flavour to butter and (*b*) to counteract lipolytic action,

and proteolytic action through the activities of proteolytic bacteria. The growth of lactic acid bacteria can be looked on as a safety factor in cream treatment, since, in the manufacture of butter in the Dominions, for instance, lactic acid can be easily got rid of by neutralisation, but it is impossible to get rid of butyric or stinking odours completely, even by aeration or "pfaudlerisation" of cream.

Our full-flavoured butter is manufactured from cream ripened to an acidity of about 0·35 per cent. Continental and Irish creamery butter is of this type. Provided that such butter is on the consumer's table within 4 weeks of manufacture it will hold its market. Later it will show signs of deterioration in developing off-flavours such as fishiness, mould-rancidity, or incipient tallowiness. This state of affairs follows from the high acidity of the serum which is a property assisting fat autoxidation. The countries cited above are so geographically situated with respect to the market in Great Britain that the management of supplies takes this fact into account. Butter from our Dominions must possess, first and foremost, good keeping qualities, and in attaining this end flavour has had to be sacrificed. We therefore find that Dominion butter, although of excellent texture and uniform composition, has a flat flavour compared with Irish butter. The reason for this is that Dominion butter is made from graded cream neutralised down to a titratable acidity which is sometimes less than that of fresh cream.

Manufacture of Dominion Butter

In the Dominions, cream is collected from surrounding districts into a central factory where it is graded according to wholesomeness of smell and flavour into choice, first, and second grades. Varying acidity plays no part in the grading. The various grades are bulked and the acidity determined. From prepared neutralisation tables, sufficient sodium bicarbonate is added to neutralise the acidity down to a desired level (0·09 to 0·11 per cent. in New Zealand and 0·11 to 0·15 per cent. in Australia). The neutralised cream is flash-pasteurised at 175° to 180° F. and then quickly cooled and run in vats where the cream is held overnight at 45° F., during which the fat globules regain the physical state necessary for butter churning. Slight off-odours of the first grade necessitate a certain amount of aeration of the hot cream before cooling; this, in the case of the second grade, is carried out more thoroughly. The different grades are, however, seldom mixed for churning. Pasteurisation is necessary to kill off micro-organic life in the cream and to drive off the carbon dioxide which would cause trouble in the churning process later. Neutralisation with bicarbonate must be carefully done or the butter will have a soapy, over-neutralised, or "scony" flavour. Cream of lime has also been used to neutralise lactic acid in cream. This reagent must not be used to neutralise cream down to an acidity below 0·18 per cent. or the butter will have a "limy" flavour.

The butter so manufactured has a neutral serum which is conducive to long storage qualities. There are no free fatty acids in the fat and no diacetyl, which is quite as strong a pro-oxidative catalyst in butter as free oleic acid. It appears that whatever amount of the precursor of diacetyl was present in the acid cream before neutralisation is destroyed or volatilised before the churning process. It is possible that traces in the butter are responsible for the few cases of fishy flavour met with in Dominion butter nowadays. The uniformity of quality of Dominion butter is one of its chief marketing assets. It is a worthy feat of food manufacture to produce butter in the Antipodes which has to keep for four to six months before it is consumed and yet compete favourably on the London market with butter which can reach our tables within fourteen days of manufacture.

Boxed butter stored for a considerable length of time suffers from many minor faults. The timber used for the box may confer a taint on the outside layer of butter—the so-called "wood taint" of butter boxed in stinker pine or hoop pine boxes. Spraying the inside of the boxes with casein dissolved in borax and hardening with formaldehyde, or wrapping the butter in vegetable parchment interleaved with metal foil, have been suggested as remedies. Partial drying of the outer layer of butter leads to the defects of "toppiness" and primrose colour, both of which are drawbacks in the trade, especially where blending is being done. Vegetable parchment is the most hygienic wrapper for butter and would be ideal to avoid wood taint and moisture loss if it were more moisture-proof.

Taints in Butter

Butter is subject to a large number of off-flavours due to micro-organic action. Thus we have mould (or ketonic) rancidity, stinking flavour from bacteria in the wash water, butyric rancidity from moulds and bacteria, stinking and other unwholesome flavours from proteolytic bacteria originally present in cream, and comparatively rare flavours such as "peanut" and "rabbit" flavours. The prevention of these flavours rests in the proper treatment of the cream and care of the processing plant.

Chemical flavours are happily rarer in incidence than five to ten years ago. Lipolytic flavours can be easily diagnosed and explained. Long-stored butters, even when stored at 28° F., still suffer from rare incidences of fishiness, tallowiness, and other autoxidative off-flavours. Fishiness is the result of an oxidative hydrolysis of lecithin, trimethylamine oxide being formed from the choline residue; the oxide joins on at the double bond to form the substances responsible for the fishy flavour. High serum acidity and metallic contamination (copper and iron in small traces) are conducive to the development of this taint, which later gives place to taints due to autoxidation of the butterfat proper—tallowiness, lardiness, and toppiness. Care should be taken to neutralise cream to a low acidity in order to obtain a product of good keeping quality. The surfaces of the metal sheeting, etc., of plant should be in a well-plated condition to avoid undue metallic contamination of the cream.

The remarks on cream neutralisation, of course, refer to Dominion butter only, which must of necessity stand up to long storage. Butter produced close to its market suffers little from chemical taints and can with ease maintain its uniform properties of texture and aroma. Other interesting problems concerned with butter are the relation of its colour to its vitamin content and the effect of cold storage on its "spreadability" on bread.

FOOD RESEARCH in U. S. A.

The following is a further extract from Dr. H. B. Cronshaw's paper on the Training of the Food Technologist and deals with food research in relation to education.

IN NORTH AMERICA, and in Germany also, technological instruction is intimately bound up with research; it is therefore necessary to deal with both aspects conjointly.

National Canners' Association

Perhaps best known to British workers is the National Canners' Association with laboratories at Washington, San Francisco, and Seattle. In addition, the Association collaborates with various universities, particularly in physiological research, and maintains, it is interesting to note, "close relations with educational and scientific institutions". Sometimes chemists employed by its members undergo a period of preliminary training in the laboratories of the Association. The bacteriological and tinplate corrosion investigations conducted by this body have been of outstanding merit. On the physiological side, important contributions to the knowledge of vitamins, ptomaine poisoning, and botulism have been made. The link with agriculture is provided by the Association's Bureau of Raw Products Research, whose function is to interpret to agricultural research institutions the needs of the canning industry and to bring to the notice of canners any agricultural researches that are likely to be of service to them.

Institute of American Meat Packers

Meat interests are represented by the Research Laboratory of the Institute of American Meat Packers, which is situated in the University of Chicago. This laboratory was founded in 1924 in accordance with the sound principle of combining research with technological education on the German plan. An agreement between the Institute and the University was reached whereby the work of the laboratory is conducted in harmony with the scientific and educational ideals of the University. The curing of meats and the prevention of spoilage have claimed chief consideration. Work of an analytical and commercial character is delegated to the Service Laboratory of the Institute situated in Chicago. Under the joint auspices of the Institute and the University, what is termed a "four-year residence course in meat packing" is offered at the latter place with the idea of "recruiting for the industry college trained men whose education has been designed to make them specially serviceable to the industry".

After three years of general education, the student enters the Institute for specialised courses. Throughout the fourth year he is brought into close contact with operations in the factory by means of visits and special lectures by experienced executives.

Research Laboratory of the Institute of American Meat Packers, founded by Thomas E. Wilson at the University of Chicago.

Bureau of Chemistry of Soils

Under the U.S. Department of Agriculture is the Bureau of Chemistry and Soils, one of whose subsidiaries is the Chemical and Technological Research Branch. This branch is split into eight "divisions", of which four are concerned with foods—viz., the Carbohydrate, the Protein and Nutrition, the Food Research, and the Oil Fat and Wax Divisions. It is the Food Research Division which is primarily concerned with "the technology of food products and such fundamental chemical research as may be required in the solution of food technological problems". In this division research fellowships have been established from time to time by certain industries, the salary and other personal expenses being borne by the industry sponsoring the fellowship, while the Bureau furnishes laboratory facilities, professional consultations, and supervision. The Carbohydrate Division at Washington, D.C., works in close co-operation with the confectionery, syrup, honey, and sugar industries; here the investigations of Dr. H. S. Paine into fondants are of special interest. Among the many subjects that have been tackled by the Food Research Division may be mentioned the effect of light on foods, the ethylene treatment of fruits, pickle fermen-

A view in the laboratory of the U.S. Citrus Products Station, Bureau of Chemistry and Soils, at Winter Haven, Florida, showing experiments in progress on the preservation of orange juice.

The Horticultural Products Building of the Oregon State Agricultural College at Corvallis, showing the Canning Room added in 1922.

tation, food poisoning, the preservation of citrus juices at the Citrus Products Laboratory opened at Winter Haven, Florida, in 1931, and the freezing of fruits at the Laboratory of Fruit and Vegetable Chemistry at Los Angeles (under the direction of E. M. Chase), and at the Frozen Pack Laboratory at Seattle, opened in 1931 (under the direction of H. C. Diehl).

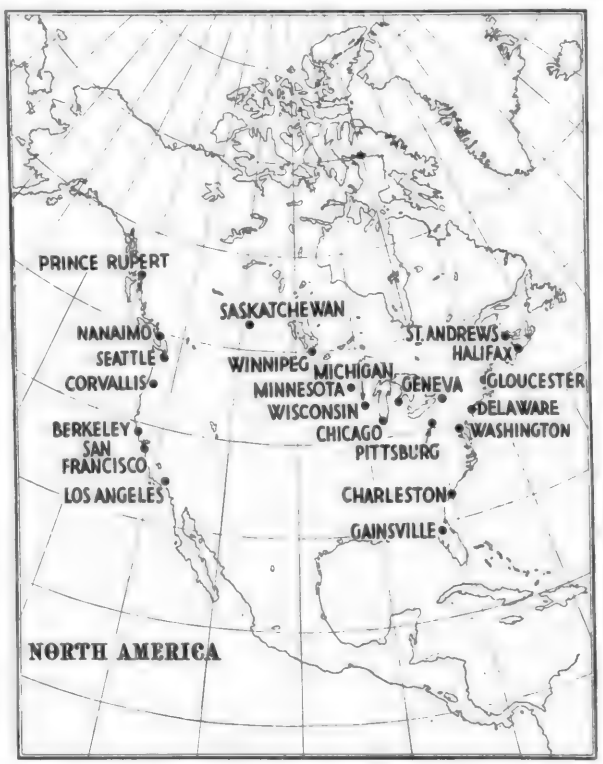
Bureau of Fisheries

Investigations relating to fish products come under the Bureau of Fisheries, which is a subdivision of the Department of Commerce. The Bureau maintains well-equipped laboratories at Washington, D.C.; Gloucester, Mass.; Seattle, Wash.; Charleston, S. Car. Special attention has been devoted to the preservation of fish and to by-products such as oil and meal. Another institution which does useful work is the California State Fisheries Laboratory at Terminal Island, under the supervision of W. L. Scofield.

The work carried out by these laboratories has been reviewed on several occasions in this journal and will therefore not be repeated here.

The Oregon Canning School

In U.S.A. practical instruction in fruit and vegetable canning has been given since 1919 at the Oregon State Agricultural College, at Corvallis, under the direction of Professor E. H. Wiegand. In a personal communication Professor Wiegand states that "our canning facilities are modern; we have automatic equipment and run our cannery every year, packing products on quite an extensive scale from our own plots, where breeding work is being carried on for different varieties of fruits and, in a minor way, vegetables. Our most extensive experiments have been those dealing with dried prunes and maraschino cherries, concerning which we have published several bulletins. Our graduates are engaged in research and as plant operators, field men, and inspectors, both at home and abroad".



Distribution of Food Research Centres and Laboratories throughout North America.

The Fruits Products Laboratory

A centre of extraordinary activity is the Fruit Products Laboratory under the direction of Professor W. V. Cruess. This laboratory is a part of the College of Agriculture and of the Agricultural Experiment Station of the University of California, at Berkeley. It furnishes instruction to university students on food preservation, analysis of fruit and vegetable products, and the principles and practice of the manufacture of these products. It also conducts researches (concerning which the literature is voluminous), furnishes advice to fruit growers, canners, olive processers, dried fruit packers, and now also to wine makers, and it devises and develops new fruit products and attempts to interest manufacturers in producing them. Referring to the educational side, Professor Cruess writes, "This is one very effective means of carrying the results of our work to industry", an excellent principle which is stressed in the present paper.

One of the Chemical Laboratories of the National Canners Association, Washington. A study of the electro-chemical reactions between the can and its contents of fruit is in progress.

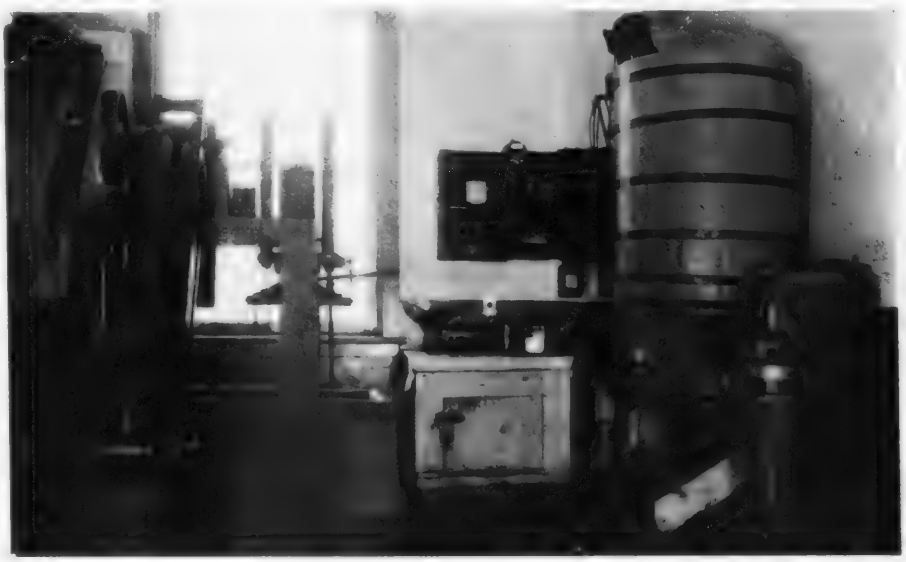
Other Institutions

I have briefly referred to what are perhaps the main organisations, but, of course, there are many others which interest themselves in various ways in special aspects of the industry. There are, for instance, the State agricultural institutions, which include about fifty colleges and sixty experiment stations in the U.S.A. These, with the Department of Agriculture, form a unified system of research, advisory and educational activities applied mainly to agriculture, but in some degree also to the food industries. For example, the researches of Tarr, Myers, and Baker at the University of Delaware Agricultural Experiment Station on the formation of pectin gels are classical.

At the Michigan State College studies have extended over the past ten years on the vitamin content of canned foods. Here also Dr. Fabian and his associates have investigated cucumber fermentation. At the Wisconsin University (College of Agriculture), Professor H. F. Wilson has spent several years studying the spoilage of honey. The New York State Experiment Station at Geneva celebrated its fiftieth anniversary in 1932; it has a very large volume of literature to its credit on the bacteriology of milk products, tomato products, and sauerkraut. Dr. Dahlberg, Chief of Research, has recently prepared a bulletin on a new method of manufacturing cream cheese. The brilliant work of Dr. C. H. Bailey and his associates at the University of Minnesota (Division of Agricultural Biochemistry) on cereal chemistry attracts graduates from all over North America; industrial fellowships are maintained on yeast fermentation problems, on the use of dried milk in baked products, and on shortening compounds; the nutrition laboratory under Dr. L. S. Palmer at the animal husbandry group is studying the inheritance of food utilisation with the object of raising strains of domestic animals which will grow more economically.

The Food Research Institute at Stanford University, California, is well known for its economic and also for its chemical studies of wheat and of fats and oils; here the director, Carl Alsberg, gives lectures one hour a week for three months on the chemistry of food manufacture.

The horticultural department of the University of Florida at Gainsville is doing interesting work on citrus juices and, at the Mellon Institute of Industrial Research, where fellowship work is pursued on a contract basis with firms known as "fellowship donors", investigations have been carried out on the influence of aluminium in nutrition, synthetic sausage skins, gelatin, coffee, bread improvers, and cereal breakfast foods. This system of fellowships is widespread in universities, colleges, and similar institutions, and they are usually given to graduates working for their doctor degrees. Finally, one might mention the various industrial associations, such as those for baking, bakery engineering, biscuits, evaporated milk, gelatin, fats and oils, and carbonated beverages, which in some cases have their own research laboratories and in others maintain fellowships in outside institutions.



A corner of the Fruit Products Laboratory at Berkeley, California, showing a press on the left, a 100-gal. vat fitted with electric mixer (the motor just shows at the top of the vat), and a centrifuge on the right.

INDUSTRIAL NEWS

Business Efficency Exhibition

A wide range of subjects dealing with commercial and industrial life in all its phases will be covered in the series of lectures to be given during the run of the Business Efficiency Exhibition at the White City from October 2 to 12.

The Exhibition will be opened by the Rt. Hon. the Viscount Leverhulme, on the Wednesday afternoon, when the gathering will be presided over by Mr. E. C. Rylands, Chairman of the Office Appliances Trades Association of Great Britain and Ireland, for it is under the auspices of this Association—an international organisation—that the Exhibition is held.

The lectures, which start at 7 p.m., are as follows:

Thursday, October 3.—Lecture by Sir Ernest Benn, Bart., C.B.E., "Advertising and Efficiency," arranged by the Advertising Association.

Friday, October 4.—Lecture by Mr. E. S. Byng (Vice-Chairman: National Institute of Industrial Psychology), "Some Human Aspects of Office Organisation," arranged by the National Institute of Industrial Psychology.

Monday, October 7.—Lecture by Mr. C. H. Tucker (Vice-Chairman: Office Management Association), "Future Developments in Office Mechanisation," arranged by the Office Management Association.

Tuesday, October 8.—Lecture by Sir Charles Mander, D.L., J.P., "Can We Reduce Hours of Labour?" arranged by the Incorporated Sales Managers' Association.

Wednesday, October 9.—Lecture by Sir Frederick Marquis, J.P., "Truth in Retailing," arranged by the Retail Trading Standards Association.

Thursday, October 10.—Lecture by Mr. F. C. Lawrence, B.Sc.Tech., A.M.I.E.E., F.C.W.A., "How Costing Increases Profits".

▼ ▼ ▼

The marriage took place on Saturday, September 1, 1935, at Howard Street Methodist Chapel, Sheffield, of W. Alan Jenkins, only son of Major R. W. Jenkins (Chairman, Robert Jenkins and Co., Ltd., Rotherham), to Vera Hirst, M.Sc., daughter of A. Hirst, Esq., Managing Director of Reid and Oxley, Ltd., cutlers, Sheffield.

Supplies of Beet-Sugar Molasses

The quality of molasses manufactured in the United Kingdom from home-grown beet during the first half of this year was 1,073,052 cwt., and the quantity exported was 314,587 cwt., there being a balance retained for use and consumption in the United Kingdom of 758,465 cwt. For the first half of last year the corresponding balance was 503,118 cwt., and for Jan.-June, 1933, 259,580 cwt.

D M. Boiler Enamel

D.M. Boiler Enamel, manufactured by Houseman and Thompson, Ltd., Exchange Buildings, Newcastle-upon-Tyne, is a liquid which is fed into boilers with the feed water. Its action is to place a film round all particles of scale-forming matter which renders it impossible for them to adhere together, so that they fall to the bottom as mud. The same film or enamel forms upon all surfaces in contact with the water, and is a protection against pitting and corrosion. The steam driven off is pure, and this product is largely used by brewers, dairies, hotels, and cooked food manufacturers, as well as in a number of hospitals and institutions.

Death of Mr. C. T. Kingzett

The death occurred at his home at West Byfleet, Surrey, on July 29, 1935, of Mr. Charles Thomas Kingzett, whose name was known throughout the chemical industry on account of his valuable contributions to the literature of chemistry. Mr. Kingzett, who was 82 years of age, was one of the founders of the Institute of Chemistry, and at the recent Charter Jubilee celebrations of the Institute it was recalled that he became a Fellow in 1877 and was a member of the Council from 1877 to 1882 and again from 1893 to 1894.

His researches in chemistry embraced a number of subjects, concerning ozone and the oxidisation of terpenes and essential oils by air, oxygen, and ozone, the first isolation of calcium hypochlorite from bleaching powder (1875), the discovery of the antiseptic properties of hydrogen dioxide (1876), and various other investigations concerning the subjects of disinfection, bacteriology, and hygiene.

Sugar from Flowers

Beetroots as sugar have a rival—dahlias. Moreover, these brilliant-coloured flowers, whose sole purpose hitherto has been a decorative one, are claimed to yield sugar nearly twice as sweet as ordinary cane or beet sugar.

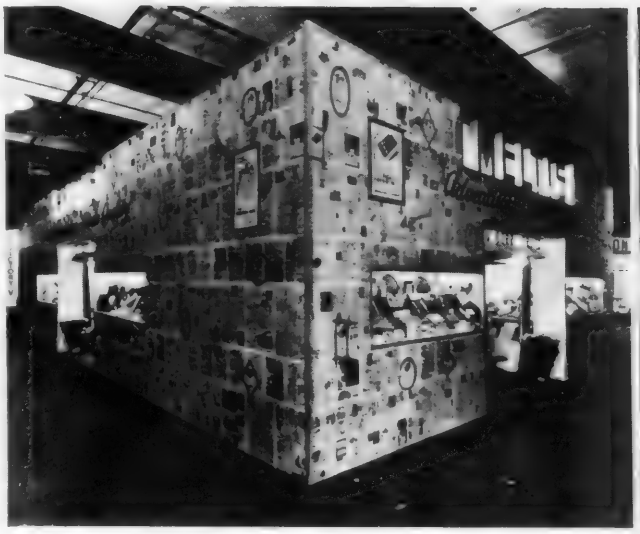
Levulose is the name given to this dahlia sugar, and its simplicity of extraction makes it commercially practical, according to its discoverers, Drs. Le Roy Wetherby and W. M. Bieger, of Southern California University. More important still, its slimming qualities will make it popular with the feminine sex, while its cheapness will appeal to the economically minded.

Novel Contrivance for Canned Food

Canned food is assuming such an important part in social economy that a novel contrivance recently introduced by Dutch manufacturers should be noted. They are now packing food in double metal containers, the outer lining of which is divided into unequal compartments, the larger containing quicklime and the smaller water. When it is desired to warm the food the can is placed upside down and the diaphragm separating the two divisions of the lining is pierced. As the water thus released comes into contact with the quicklime, intense heat is generated which is imparted to the inner compartment containing the food. In order to prolong and control the heat the quicklime is distributed in a spongy composition. This ingenious application of a very old practice, originally intended for stores on small ships, exploring parties, and travellers generally, appears to be coming into more general use.

Mr. B. P. Flockton

We regret to announce the death of Mr. B. P. Flockton, who until recently was in the employ of Manlove, Alliott and Co., Ltd., engineers, of Nottingham, for over thirty years as oil mill expert. Mr. Flockton was sixty-three years of age and a member of the Institute of Mechanical Engineers and the Institute of Chemical Engineers, a Past Master of the Wiggeston Lodge, Leicester, and Founder Member of the Galway Lodge, Daybrook. He was highly esteemed by his colleagues and the Directors of his Company, and his passing is a great loss to the firm.



The stand of Meltis, Ltd., was one of the most original at the Chocolate and Confectionery Exhibition, which was held at Olympia from August 21 to September 5.

One of the most striking stands at the Bakers' and Confectioners' Exhibition, which was held at the Royal Agricultural Hall from September 7 to September 13—that of Malga (London), Ltd., makers of cream, soft icings, marshmallows, essences, etc. This stand was the only one with a roof on which visitors could be entertained, twice the space being obtained thereby.

B.I.F. and Earl's Court

The Department of Overseas Trade announces that arrangements are being made for a portion of the British Industries Fair for 1937 to be housed in the new exhibition buildings which are to be erected at Earl's Court. The remaining portion of the Fair in London will be held as usual at Olympia.

South African Exhibition

The fiftieth anniversary of Johannesburg is being celebrated by a South African Empire Exhibition from September 15, 1936, to January 15, 1937, approximately. Mrs. L. Digby, of Tropical Products, is taking a stand in the Overseas Section for her products, while one or two other interests will also be grouped on this stand.

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A big national advertising campaign is about to be launched by Rowntree and Co., Ltd., to announce a new process which has been applied to their cocoa. Large spaces in leading national dailies and weeklies, women's magazines and periodicals will appear, through J. Walter Thompson Co., Ltd.,

Batchelor and Co. (Sheffield), Ltd., are about to launch an extensive national advertising campaign for packaged and canned peas.

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Anchor Chemical Co., Ltd., Clayton, Manchester, have now a London office at Shell-Mex House, Strand, W.C. 2. Telephone: Temple Bar 7330.

Change of Headquarters

The Confederation of Management Associations is about to take up its headquarters at British Industries House. The Confederation was formed as the central co-ordinating body for associations which make a study of industrial and commercial problems. It recently took over a series of conferences at Balliol College, Oxford, held from September 25 to September 30, where various problems, such as shorter hours, mechanisation, etc., were discussed in a practical way.

Our electric sign outside Olympia during the Chocolate and Confectionery Exhibition. ("F.I.W." photograph.)

A Menace to Retailers

Mr. T. E. Lescher, managing director and chairman of the Liverpool Chamber of Commerce, moved the following resolution on behalf of the Liverpool Chamber of Commerce at the autumn meeting of the Association of British Chambers of Commerce held at Derby on September 25:

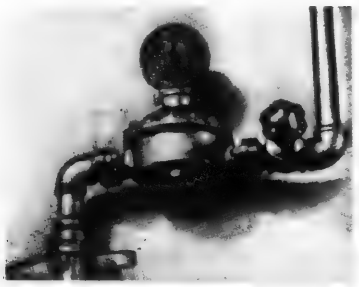
"That this Association of British Chambers of Commerce views with concern the continued growth of trading in Factories, Workshops, and Offices by employees who retail such commodities as Tobacco, *Sweets*, Hosiery, Clothing, Fancy Goods, etc., as those indulging in such practices are not only wasting their employers' time but their activities are a menace and definitely detrimental to legitimate rate-paying stores and shops."

Central Agricultural Bibliography

A scheme has been brought forward for an Agricultural Bibliography for this country, which would place it in a unique position in this direction at a time when all branches of agriculture are being considered from an industrial and national point of view.

A preliminary announcement has been made, giving an outline of the scheme, the organisation proposed, technical details, etc. Pending the formation of the General Bibliography Committee offers of support and all information on this subject should be sent to or obtained from the Hon. Secretary, Agricultural Bibliography Committee, 27, Willow Road, London, N.W. 3.

Flow Meter Measures Syrup



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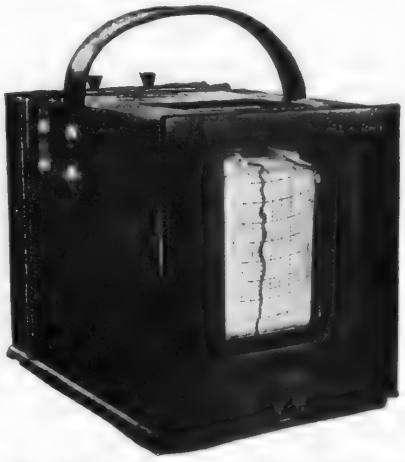

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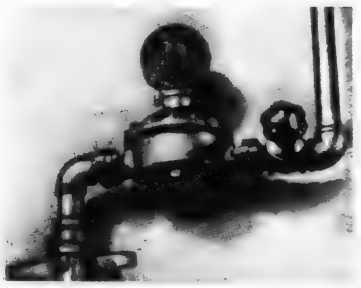

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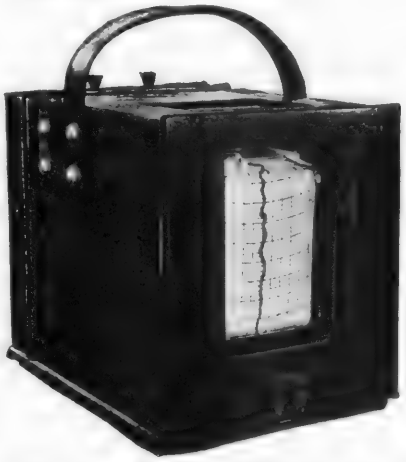

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THE CHEMISTRY OF

CHEESE RIPENING

by J. G. Davis, Ph.D., M.Sc.

The National Institute for Research in Dairying, Reading.

THOSE CHEMISTS who have examined and tasted the curd formed during the process of cheese manufacture, and compared its properties with those of the cheese resulting from it some months later, will naturally be interested in the chemical changes responsible for the marked differences between the two products.

The fact that all varieties of cheese, from soft cheese such as Cambridge, Camembert, and Limburger, to the semi-hard cheese such as Roquefort and Brick, and the hard cheese such as Cheddar, Dutch, and Swiss, may be made from one and the same milk offers a problem of great scientific interest and practical importance.

Cheese making depends essentially on the clotting of milk by one or more proteolytic enzymes. Although rennet is usually used, milk may be coagulated by pepsin and to some extent by the tryptases, and also by the proteolytic enzymes secreted by birds, reptiles, most fish, plants, fungi, and bacteria. In many cases, however, these enzymes are not suitable for cheese making. Thus in the case of the phytochymases the proteolysis is not sufficiently intensive. There is also a tendency to bitterness in such cheese, which may possibly be correlated with the production of certain protein intermediates ("peptones"). True chymase (or rennin) is obtained from the fourth stomach (abomasum) of the calf, which is peculiar in this respect, for it has been found that the ratio of peptic to rennin activities differs in the gastric secretions of the calf and the cow, the former having about seven times as much rennin as the latter. In other animals this ratio is apparently constant. Rennet as used for cheese making always contains pepsin, and the two enzymes are now recognised as distinct entities, pepsin having been shown to be a protein and rennin a thioproteose. The latter is an extremely powerful enzyme and is able to clot about 5,000,000 parts of its weight of milk. In practical cheese making, however, about 3 oz. of rennet are used for every 1,000 lb of milk.

Mechanism of Rennet Action

It is now generally agreed that rennin acts only on the casein in milk, which protein, however, appears to be a mixture of at least three substances. The presence of cations is essential for the formation of the clot, and calcium is the most active in this respect, although magnesium and zinc are almost as effective. Rennin has no action on the colloidal calcium phosphate which is closely associated with casein in milk, as was at one time supposed. Numerous theories have been advanced to explain the peculiar action of rennet, and of these the most acceptable in the light of modern work is that of Linderstrøm-Lang. According to this theory, casein has three constituents, one of which acts as a protective colloid for the other two. Rennet attacks this constituent and so causes the equilibrium of the system to be upset. It is well established that when milk is clotted a definite change in the nature of casein is produced, but the exact nature of this change is still a matter of opinion. No significant physico-chemical changes occur during the clotting process, and the chemical properties of the changed casein (or paracasein) are almost identical with those of ordinary casein. However, casein that has once been clotted by rennin cannot be reprecipitated by the enzyme.

The optimum hydrogen-ion concentration for coagulation is at *p*H 6·2, but this is a resultant value, as the clotting depends on at least two reactions—(i) the chemical alteration of the casein, which is an enzymic process having an optimum *p*H of 5·4, and (ii) the formation of the gel by the combination of the paracasein with calcium or other ions. The greatest rate of rennet action occurs at 41° C. In cheese making, however, rennetting at these optimum conditions of acidity and temperature would produce a very rapid-working and unmanageable curd. In the Cheddar process a temperature of about 84° F. (29° C.) and a *p*H of about 6·47 (approximately 0·2 per cent. lactic acid) are used for the formation of the curd.

Manufacture of Cheese

Of the original constituents of the milk, an unripened cheese contains the casein, most of the fat, the insoluble salts and colloidal material and, in addition, varying amounts of moisture containing the unchanged lactose, albumin, and the soluble salts. During the making process the moisture and soluble substances in it are expressed from the curd by the combined actions of cutting, development of acidity, "scalding" (*i.e.*, raising the curd in the whey to a temperature of about 100° F.

[38° C.]), and, when the whey has been run off, by the pressing of the curd. Finally, the inclusion of salt at a later stage still further accelerates the rate of loss of moisture.

The function of salt in cheese is largely a preservative one; thus in soft cheese sufficient salt is usually added to inhibit most of the undesirable bacteria and the streptococci, but other cocci and lactobacilli are able to develop. Consequently, soft cheese tend to contain fewer bacteria than the less strongly salted cheese. It may be mentioned, however, that soft cheese are not pressed and therefore retain more moisture and lactose, with a consequently higher development of lactic acid in the curd.

During the curd-forming process the *p*H is of the utmost importance, and this progressively decreases as the "starter" bacteria ferment the lactose in the whey to lactic acid. When the curd is separated from the whey, 95 per cent. of the bacteria remain in the curd, and for this reason acidity develops at a faster rate in the curd than in the whey. With an increase in acidity the physical nature of the curd changes and brings about the "matting" which is characteristic of the cheese-making process. Different cheese naturally come to equilibrium at various *p*H values; Cheddar cheese reaches a *p*H value of from 4·9 to 5·0 in a few days, and this is the approximate value for all hard-pressed cheese.

In a few cases the curd is precipitated by acid alone, but cheese produced in this way do not develop the finer qualities of rennet-made cheese. The curd produced by rennet action is elastic and shrinks, whereas an acid curd is open and sticky. Different temperatures are used for rennetting the various types of cheese; thus cream cheese are rennetted at from 21° to 25° C., at which temperatures a soft, pliable, jelly-like curd is produced. The Cheddar curd is formed at from 28° to 30° C. and is correspondingly firmer. In the manufacture of Limburger cheese a temperature of about 33° C. is used, and the curd is quite tough and rubbery. Thus the elasticity of the curd increases with the temperature at which it is formed.

Hard cheese contain only from 30 to 40 per cent. water, but soft cheese may contain up to 55 per cent. and are naturally more perishable on account of the greater opportunities for bacterial action. In all types of cheese, however, the lactose disappears in a few days, persisting longest in soft cheese, in which it may be detected when the cheese is ten to fourteen days old.

The interiors of both hard and soft cheese are anaerobic on account of the high biological oxygen demand. Hard cheese ripen fairly uniformly throughout, but somewhat faster in the centre, partly on account of the slower loss of moisture. In soft cheese, however, the ripening proceeds from the outside inwards.

Chemical Changes During Ripening

As the cheese ripens the curd gradually changes from a tasteless, acid-smelling, rubbery mass to a waxy, mellow material of characteristic aroma and pungent taste. This transformation is brought about by physical and chemical changes due to the combined activities of the enzymes in the rennet and of the bacteria, chiefly the lactic acid bacteria.

The most important chemical changes occur in the proteins, and in the case of a ripe hard cheese about one-third of the casein becomes soluble in water. In addition, a certain amount of amino-acids is produced, but very little ammonia. In soft cheese, as might be expected from the fact that they contain more moisture, up to 95 per cent. of the protein may become soluble, and appreciable amounts of ammonia are produced.

TABLE I.

CONDITIONS CONTROLLING RIPENING

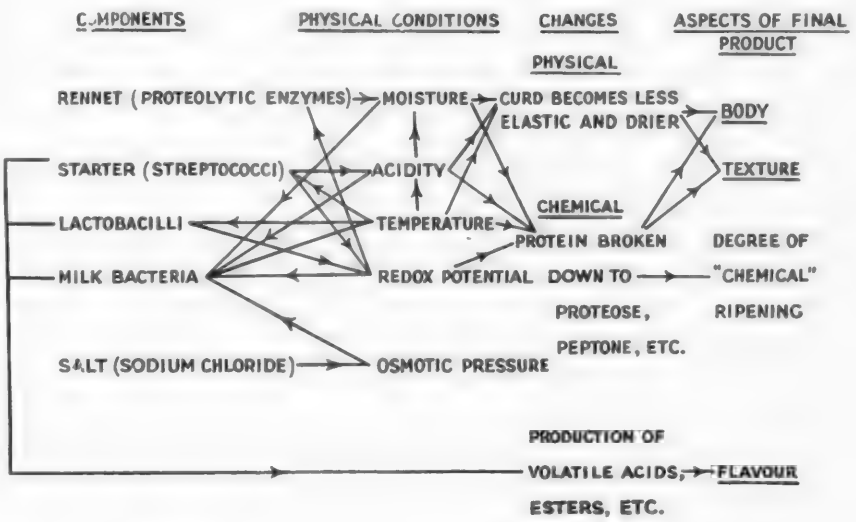
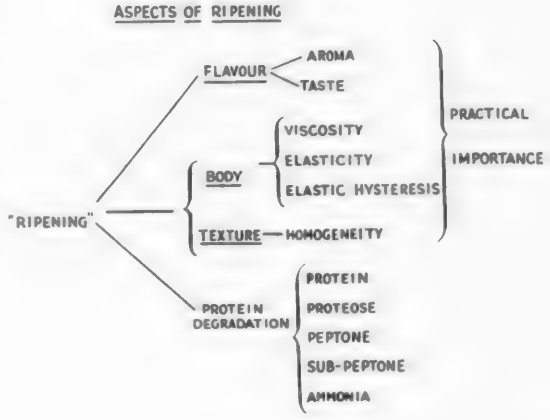


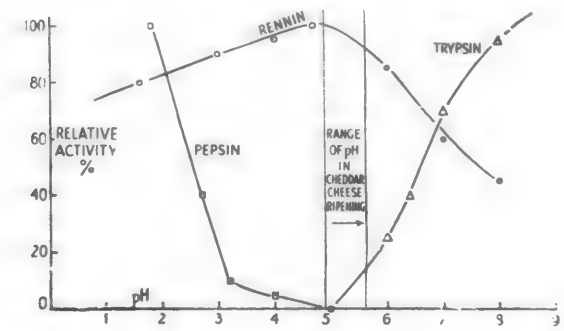
TABLE II.

ASPECTS OF RIPENING



This proteolysis is responsible presumably for the marked changes in the physical properties of the curd. The waxy, non-elastic cheese is thus an intimately mixed complex of unchanged proteins and proteoses, peptones, polypeptides, amino-acids, water, and fat. The higher the proportion of fat, the "waxier" and "silkier" the feel (or "body") of the cheese.

It has been mentioned that rennet contains both rennin and pepsin, and although it has been loosely stated in the past that the pepsin of the rennet is responsible for this proteolysis, it is evident from modern work on the nature and mode of action of proteolytic enzymes that pepsin, which acts only on casein at *p*H values below 4·6, cannot be active in cheese. (See figure below.)



We may ascribe, therefore, the chief changes in the casein to the *papainase* enzyme in rennet (rennin), for the *p*H of ripening cheese is almost at an optimum for the action of this enzyme. However, papainases do not cause a very intensive breakdown—*i.e.*, the protein undergoes preliminary scission but tends to stop at the "peptone stage". The further degradation to polypeptides and amino-acids is brought about by peptidases, which are usually present in rennet and have an optimum *p*H somewhat higher than papainases—viz., about 6·2. As the cheese ripens and the *p*H shifts from 5·0 to 5·4-5·6 this enzyme naturally becomes increasingly active. A certain amount of amino-acid liberation is probably caused by the lactic acid bacteria and other micro-organisms present. Some types of lacto-bacilli are markedly proteolytic near the neutral point, producing amino-acids directly from proteins, according to some authorities. At the acidity of cheese, however (*p*H 5 to 5·5), the proteolytic activity of these bacteria is very slight. The hydrogen-ion concentration of ripening cheese is insufficient to cause any measurable hydrolysis of itself.

It may be taken as definitely established that the rennet enzymes are almost entirely responsible for the major proteolytic changes, as cheese made with bactericidal substances such as chloroform undergo proteolysis to almost as great an extent. It is noticeable, however, that these "chloroform" cheese develop neither the characteristic cheese flavour nor the small but definite increases in amino-nitrogen that are found in normal cheese ripening. In Tables III to V are given typical figures for the nitrogen distribution in different types of Cheddar cheese at different degrees of ripening expressed as percentages of the total nitrogen.

TABLE III.

NITROGEN DISTRIBUTION IN AMERICAN CHEDDAR CHEESE MADE FROM MARKET MILK (VAN SLYKE AND PUBLOW).

Age of Cheese.	*Water Soluble N.*	*Peptones.*	*Amino Acids.*	*Ammonia.*
1½ months	21	7	10	1·5
3 ,,	31	9	14	2·5
6 ,,	36	9	20	3·5
12 ,,	45	8	28	5·5

It will be observed that, although the water-soluble nitrogen, amino-acid nitrogen, and ammonia nitrogen increase progressively throughout the ripening, the peptone nitrogen remains stationary.

TABLE IV.

ENGLISH CHEDDAR CHEESE MADE FROM CLEAN MILK (DAVIES AND DAVIS).

Age in Days.	*Trichloracetic Acid Soluble N.*	*Total Amino N. (Sorensen).*	*Non-protein (Sorensen).*
7	7·4	1·3	0·3
31	14·9	4·0	2·9
187	28·3	13·4	11·5

TABLE V.

ENGLISH CHEDDAR CHEESE MADE FROM CLEAN AND FROM MARKET MILK (ALLEN).

Age in Days.	*Water Soluble N.*		*80 per cent. Alcohol Soluble N.*	
	Clean.	*Market.*	*Clean.*	*Market.*
0	10·0	17·9	3·0	6·2
8	24·4	38·7	8·3	7·7
29	23·9	25·7	7·8	9·5
63	21·7	27	7·8	11·2
89	30·3	34·6	11·3	16·3
209	31·9	34·6	14·8	19·7

Production of Flavour

It has been mentioned that cheese made with chloroform do not develop the characteristic cheese flavour, and it is concluded, therefore, that bacteria are responsible for flavour production. When a cheese mush is steam distilled, as in the determination of volatile acids, it is found that the flavour substances come over in the first fractions of the distillate. Examination of this distillate shows that there are present acetic, propionic, butyric, and caproic acids, alcohols which on oxidation give acetic, propionic, and butyric acids, and esters of these four acids. With Cheddar cheese, acetic and propionic acids are found to be at a maximum after three months' ripening, after which they decrease in amount. Butyric and caproic acids, however, increase steadily throughout the ripening period. Valeric acid is never found. From these data it has been assumed that in Cheddar cheese the butyric and caproic acids are formed from the amino-acids resulting from the proteolysis, and that the acetic and propionic acids come from the lactose, possibly by further decomposition of lactate. Also, it has been found that whereas the starter bacteria are unable to produce any butyric or caproic acid from milk fat, yet cheese cultures are able to produce these acids. It is therefore evident that in cheese which always contain the so-called "miscellaneous" bacteria (*i.e.*, other than lactic acid

bacteria) in appreciable numbers (although in a small proportion of the total bacterial population) sufficient decomposition of the fat may take place to account for at least part of the flavour. It is known that extremely minute quantities of substances may produce a sensation on the olfactory centres. Further evidence that these "miscellaneous" bacteria play an important rôle in flavour production is afforded by the observation that pasteurisation of the cheese milk (which would naturally destroy most of the "miscellaneous" bacteria present) results in a cheese of definitely mild flavour.

No significant change in the fat occurs in Cheddar cheese except in cheese ripened at low temperatures. A low temperature will preferentially favour the lipolytic *Pseudomonas* bacteria. Consequently there are found sometimes in such cheese small, waxy particles which are formed by combination between the liberated fatty acids and the calcium present. In mould-ripened cheese, however, a very extensive degradation of the fat is found, especially in the later stages of ripening, during which the lipases secreted by the mould produce appreciable amounts of the higher volatile acids—*e.g.*, butyric, caproic, caprylic, and capric acids which occur of course in butterfat. To these acids are attributed the peculiar peppery flavour of mould-ripened cheese such as Roquefort. Typical figures for such cheese are given in Table VI. It is claimed by the local makers that these types can only be made from special milks, such as sheep's milk in the case of Roquefort. Hence cheese of this type made from cows' milk are labelled Danish or American Roquefort, etc. This unsuitability of cows' milk for these special types of cheese has been alleged to be due to the higher proportions of the "peppery" volatile acids in the fat of sheep's milk. This is illustrated in Table VII. However, it would seem that sufficient of the "peppery" volatile acids are present in cows' milk to permit the production of a sufficient amount of these specific flavouring substances. Aldehydes have not been detected in Cheddar cheese, but small amounts of sulphite-binding compounds are found in the distillate from mould-ripened cheese.

TABLE VI.

VOLATILE ACIDS IN ROQUEFORT CHEESE (CURRIE).

Degree of Ripening.	*C.c.s. n/10 NaOH per 100 g. Cheese.*		
	Caproic Acid.	*Butyric Acid.*	*Acetic Acid.*
Slightly ripe	6·9	4·1	1·2
Well ripe	13·3	19·1	4·6
Over-ripe	30·4	36·3	6·3

These figures show the essential difference between mould-ripened cheese of the Roquefort type and hard-pressed cheese of the Cheddar type, in which latter the volatile acid is almost entirely acetic acid.

TABLE VII.

FAT ANALYSES.

Fatty Acid.	*Roquefort Cheese Fat (Sheep's Milk).*	*Cows' Milk Fat.*
Butyric	3·5	5·5
Caproic	4·7	2·1
Caprylic	0·6	0·5
Capric	3·8	0·3

Ripe cheese possess not only a characteristic flavour but a characteristic taste. It is evident that non-volatile substances will affect the latter. The most important of these are the salt and the amino-acids produced as the end-products of peptidase action in the cheese. To the latter may be attributed the sweet nutty taste of matured Cheddar cheese, and indeed crystals of tyrosine are sometimes found in well-ripened Cheddar cheese.

From a marketing point of view the flavour is the most important aspect of cheese, as the public is quick to detect an off-flavour or an insipid cheese, but it is less appreciative of "poor texture" or "weak body". Unfortunately by the time that cheese has been cut up, exposed for sale, and is ready for consumption, the fragrant aroma of the original cheese is largely lost. It is suggested that a method of preserving the aroma of, say, farmhouse Cheddar would result in a large increase in the demand for our home-produced cheese. The popularity of the proprietary cheese is largely due to their makers' success in offering a commodity of uniform and appetising aroma.

TABLE VIII.

CLASSIFICATION OF THE PRINCIPAL TYPES OF CHEESE (DEARDEN AND DAVIS)

SOFT CHEESE.

Unripened.

Coulommier (Fr.).	Gervais (Fr.).
Cambridge (or York).	Bondon (Fr.).
Cottage (A.).	Neufchatel (Fr.).
Cream.	

Ripened by Moulds.

Camembert (Fr.).	Pont l'Eveque (Fr.).
Brie (Fr.).	Colwick.

Ripened by Bacteria.

Limburger (B.).
Liederkranz (G.).

SEMI-HARD CHEESE.

Unpressed.

Mould-ripened Stilton.
Not mould-ripened White Stilton.

Pressed or Lightly Pressed and Mould Ripened.

Gorgonzola (I.).	Wensleydale.
Roquefort (Fr.).	Dorset Blue.
Grove City (A.).	

Pressed or Lightly Pressed, Not Mould Ripened.

Caerphilly.	White Wensleydale.
Brick.	Port de Salut (Fr.).
Kingston.	Münster (G.).

HARD CHEESE.

No Gas Holes.

Cheddar.	Gloucester.
Dunlop.	Edam (H.).
Cheshire.	Gouda (H.) (or Pantegras).
Lancashire.	Wilts.
Derby.	Cotherstone.
Leicester.	

With Gas Holes (Propionic Acid Fermentation).

Emmenthal (S.) (Swiss or Gruyère).
Parmesan (I.).

A. = American; B. = Belgian; G. = German; H. = Dutch; I. = Italian; Fr. = France; S. = Switzerland.

INTERNATIONAL COMMISSION FOR THE EXAMINATION OF FATS

THE Sixth Meeting of the International Commission for the Examination of Fats will take place this year in London, October 1 to 5. The sessions will be held at the offices of the Royal Society, Burlington House, Piccadilly, W. 1.

The Commission, which meets annually, is constituted of representatives from Austria, Czecho-Slovakia, France, Germany, Great Britain, Greece, Holland, Italy, Russia, Spain, Sweden, and Switzerland. Previous meetings have been held in Rome, Prague, and Paris, but never before in Great Britain. The object of the Commission is to prepare standard methods for the analysis of oils, fats, and soap. These methods are periodically revised in the light of experience gained from year to year.

The Federal Council for Chemistry and the Society of Public Analysts nominated a representative to act in the past. The British Standards Institution, having the same representative, is conducting the arrangements for the reception on behalf of itself and other British organisations. The analytical methods referred to in the recently prepared B.S. Specifications for Vegetable Oils will form one of the subjects for discussion.

The Sixth Reunion is to be presided over by a British representative, Mr. E. R. Bolton, F.I.C., M.I.Chem.E. (Great Britain), in accordance with a custom of the Commission that the representative of the country in which the reunion is held presides over the meetings; Dr. S. Fachini (Italy) and Professor P. Rivals (France) have presided in previous years. The General Secretary of the Commission is Dr. S. Sporer of Milan.

Meetings of the Commission will take place on Tuesday, October 1, Wednesday, October 2, and Friday, October 4. The remainder of the time will be devoted to visits to research departments and to factories. A number of social functions for the entertainment of the delegates have also been arranged, including a luncheon to be held at the Royal Automobile Club on October 1, and a dinner at the Salters' Company at the end of the week.

2,000 Years Ago

New Cheese*

NEW cheese being eaten without salt, is nourishing, good for ye stomach, easy of digestion, encreasing the flesh, & indifferently mollifying ye belly. Yet somme is better than other according to ye nature of the milke of which it is made. But being sod, & strained out, afterward roasted, it doth binde the belly, and being layed on it is good for the inflammations, & sugillations of ye eyes. But the new salted is more nourishing, being eaten is fitt for ye abating of the flesh, is bad for the stomach, grieuing the belly and the bowels. But that which is older binds ye belly; & ye whey that is made of cheese, is very good nourishment for doggs.

That which they call Hippace is Horse-cheese, of a poysonous smell, yet very nourishing, proportionally aunswering to that which is made of kine. Yet somme haue called the Horse's Rennet by the name of Hippace.

* From *The Greek Herbal of Dioscorides* (translated into English in 1655).

FOOD MANUFACTURE GOLFING FEDERATION

AUTUMN MEETING

Under the Auspices of the Food Canning Council and the Can-Can Club for the Food Manufacture Challenge Trophy and the Eburite Cup.

THE Second Annual Competition will take place at Southerndown Golf Club, near Bridgend (20 mins. by road from Cardiff) on Tuesday, October 29, 1935.

Competitions open to all associated with Canning and Food Manufacture.

Morning.—There will be a Four-ball Foursome Bogey Competition under handicap (lowest recognised club handicap; limit, 18) for sweepstake money.

Medal Competition (*Afternoon*).—All players to play a medal round (stroke play) for the Food Manufacture Challenge Cup and replica (full club handicap allowance) and Eburite Challenge Cup and replica. Open to Canners or their Staff.

Prize for best nett score not winning a cup presented by G. Fell Clark, Esq. (Robert Ingham Clark and Co.).

Prize for best hidden nine holes presented by A. Maytham, Esq. (Dewey and Almy, Ltd.).

A charge of 10s. each player (payable with entry) will be made, covering Lunch, Tea, Green Fees.

Players will make their own arrangements *re* caddies.

Application for *Entry Forms* should be made to W. L. Hill, Food Manufacture Golfing Society, 17, Stratford Place, London, W. 1., not later than Monday, October 21.

A CORRECTION

THERE is a distinction between scientific writing and sales promotion, although the patent medicine advertisements nowadays are beginning to indicate to the general public that the two can be merged.

In a little brochure issued by this office quite recently, our pet copywriter had drawn quite largely on his imagination, and he, perhaps, confusing his facts, thought that when Napoleon issued his famous announcement that an army marched on its stomach, it would be a good thing to indicate that stomachs even in those days were filled with the excellent preserved foodstuffs of Messrs. Kearley and Tonge, Ltd.

This firm is so well known to this writer of "literature" that when speaking of Mr. Samson and intending to refer to his association with Messrs. Poulton and Noel, Ltd., he inserted the other well-known firm, Messrs. Kearley and Tonge, Ltd.

Although we feel no harm is done, and this seems to be indicated by the very generous attitude of Messrs. Kearley and Tonge, Ltd., in a letter they have written us, we nevertheless wish to apologise to Messrs. Kearley and Tonge, Ltd., and to Mr. Samson for having coupled their names incorrectly, and to Messrs. Poulton and Noel, Ltd., for having omitted their name when we had intended it should have appeared.

Cleaning Milk Bottles

IT IS interesting to recall a paper by Mr. T. Dykes, manager of the S.C.W.S. Milk Department, which was presented last year to the World Dairy Congress held in Italy. This paper is a record of experience in the washing of thousands of bottles daily in the milk depôts operated by the Scottish Co-operative Wholesale Society.

The washing of bottles by mechanical means is greatly facilitated if the bottle at the outset is reasonably clean and free from adhering milk residues. For this reason customers are requested to rinse the empty bottle before returning it. This simple hygienic measure—which is carried out only in 50 per cent. of the cases—is of real advantage. The following comparison of rinsed and unrinsed bottles, made during the month of September when normal temperatures prevail, will serve to emphasise the benefits of rinsing empty milk bottles before their return by the consumer.

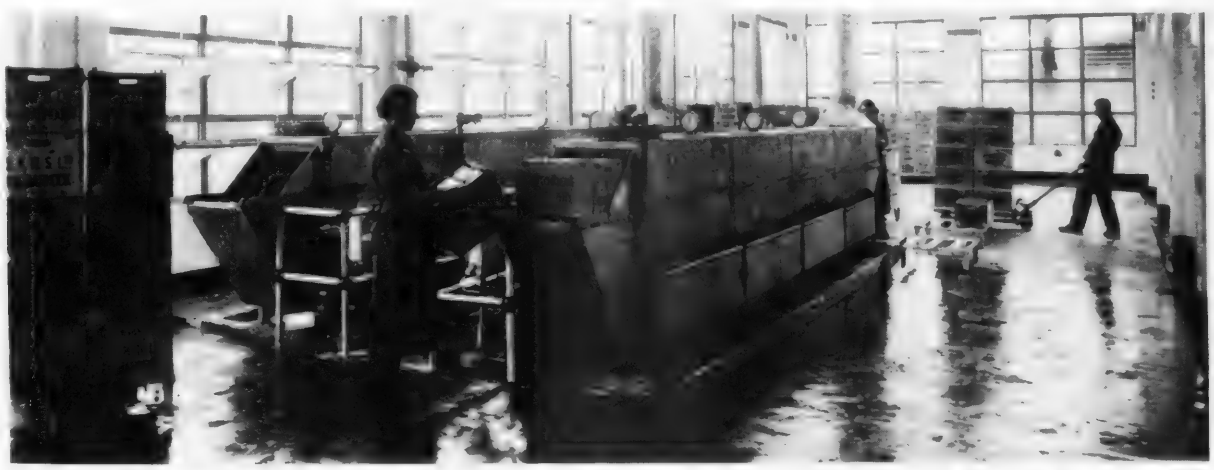
Average organisms per bottle (unrinsed) 839,350; (rinsed) 170,900. Bacterial addition per c.c. of bottle capacity (unrinsed) 1,450; (rinsed) 300. *B. coli* present in 1 c.c. of rinsing water (unrinsed) 68 per cent.; (rinsed) 15 per cent.

These data show that the unrinsed bottle contains on an average five times as many organisms as the rinsed bottle, and a much higher incidence of *B. coli*. The sanitary significance of coliform bacteria in returned milk bottles appears to warrant further investigation.

Some of the unrinsed bottles may contain much higher bacterial numbers than the indicated average; in this investigation it was found that one bottle in every eight harboured over three million organisms.

Very dirty bottles cannot be effectively cleaned by any type of bottle-washing plant, for, after passing through the machine, they will still remain infective and cause the milk with which they are subsequently filled to be heavily contaminated at the very outset. This circumstance explains why, out of a batch of some hundreds of bottles simultaneously filled, only one may give rise to complaint by the consumer. Public health officials, whose duty it is to safeguard the milk supply of the people, should forbid the return of very dirty bottles. It is no uncommon experience for a milk dealer to find that bottles

Above: Clean bottles leaving the washer at an Express Dairy, the machine being built by G. Hopkins and Sons, Ltd. *(By courtesy of the Express Dairy Co., Ltd.)*



The Bottle Washing Plant at the Witchkerowe Creamery of The Scottish Co-operative Wholesale Society, by whom it was designed and built. Each machine has a capacity of 5,000 pint or 3,600 quart bottles per hour, and each bottle receives nine washes, commencing at 100° F. and finishing with clean water at 205° F. or 212° F.

in which he has delivered milk have been used in the interval before their return as receptacles for cereals, oils, medicaments, condiments, and alcoholic beverages.

This practice should be rigidly suppressed by law.

To encourage the cleaning of bottles in the home, milk distributors might with advantage supply their customers with a mild detergent and directions as to its use. Such a policy would aid in keeping empty milk bottles in a bright and sparkling condition and might conceivably prove economical to the milk dealer. Bottle makers could also render the industry a real service by producing milk bottles of good shape and quality and with perfectly smooth, continuous surfaces.

Treatment of Milk Bottles in Depots

In the author's experience, a bottle-washing machine of the tunnel type, which is provided with four independent tanks, gives satisfactory service. Each tank is provided with two headers or jet positions, so that the bottle is rinsed twice before it leaves each tank. In its passage through the machine the bottle receives in all nine washings.

The bottles are washed in special cases or crates, the rinsing and detergent solutions being forced into and around the bottles and crates in copious volumes by means of electrically operated pumps.

The first tank supplies water at 37° C., which has a solution of 4 lb. detergent per 600 lb.

The second tank provides a clean water rinse, the temperature of the water being from 50° to 55° C. In the third tank, and in the fourth tank, water at 85° C. is forced into the bottles; a final rinse with water at 100° C. completes the treatment.

The respective temperatures in each compartment should be rigidly controlled by thoroughly reliable thermostatic valves, and should be checked regularly by standard thermometers.

The final temperature to which the bottles and their containers are subjected is of first importance; a temperature below 80° C. is not attended with satisfactory results, and 100° C. should be the aim.

The detergent employed in the first tank is composed of equal parts of sodium hydroxide and anhydrous sodium carbonate.

When a clean bottle (which, however, does not necessarily imply a sterile bottle) is desired, 2 lb. tri-sodium phosphate may be added to each 600 lb. water in the second tank. When this addition is made, the temperature of the water in the third tank should not exceed 75° C., since at 80° C. the tri-sodium phosphate is partially precipitated or crystallised out. Again, if the phosphate is used in the second tank, the detergent in the first tank may be reduced by ½ lb. (*i.e.*, 3½ lb. per 600 lb. water).

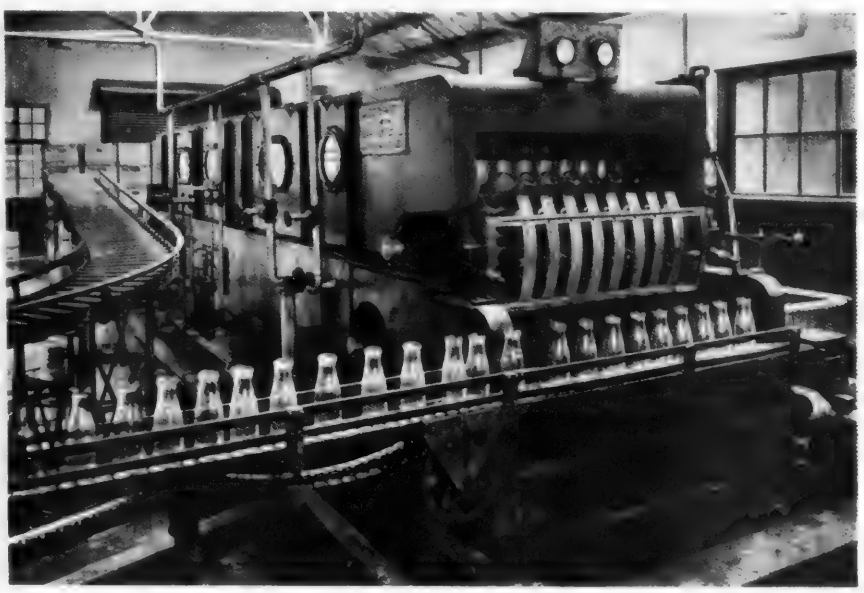
It should be noted that with this type of bottle washer the boxes or crates are washed simultaneously with the bottles, and that the bottles are not tempered with cooling sprays, but are allowed to cool spontaneously. After leaving the washer the crates containing the bottles are stacked in an inverted position so that the mouths of the bottles are directed downward, thereby diminishing the possibility of stray chips or fragments of glass remaining in the bottle.

Here are the results obtained during the past three years with this system of bottle washing in the S.C.W.S. depôts.

Percentage of sterile bottles..	68
Percentage of bottles containing less than 200 organisms per bottle	11
Percentage of bottles containing less than 1,000 organisms per bottle	15
Percentage of bottles containing less than 5,000 organisms per bottle	5
Percentage of bottles containing over 5,000 organisms per bottle	1
	100

It is of little advantage to produce a high-grade clean milk on the farm, to erect costly buildings, and to employ expensive pasteurising plants if bottle-washing methods are not satisfactory.

Inefficient washing of bottles will nullify all the best efforts in the marketing of a high-grade milk. Therefore, special attention should be given to this most important part of the routine in milk depôts, and the public health authorities should supervise more closely not only the method of pasteurising, but also the washing of milk bottles in depôts.



The 8-Wide "Super-Hydro" Bottle Washing Machine made by Dawson Bros., Ltd., at work in the dairy of the Gravesend and District Co-operative Society, Ltd. The bottles are being discharged from the machine into the conveyer to the filling machine.

INFORMATION and ADVICE

Raspberries for Jam—Horseradish Cream—Agar-Agar in Jam—Preparation of Pickles—Pickling of Green Gherkins—Chicken Essence—Preserved Ginger—Meat Extract—A Tinny Flavour—Potato Crisps—Acid Determination—Pectinol

Raspberries for Jam

1,932. *We are extremely obliged to you for your long letter in reply to our query. Our jam boiler has already made some tests on the lines laid down in your letter, with satisfactory results.*

We have found that Tasmanian raspberry in tins responds much better to the treatment suggested than Scotch raspberries in SO_2. On a former occasion you pointed out some good qualities in the latter, regarding the seeds, etc. Both for quality and price, we prefer Tasmanian raspberry pulp in tins to Scotch raspberry in SO_2. Actually, the latter work out dearer, for, contrary to your advice, our suppliers now inform us that in accordance with the specification known as "Federation Pack", 3-cwt. casks are made up of: Raspberries, 35/40 lb.; water with SO_2, 35/40 lb., total weight, 3 cwt.

For the first time, we recently weighed a 3-cwt. cask of Scotch raspberries, and we found that the contents barely weighed 3 cwt., so that we are paying for water; whereas we understood that the 3 cwt. meant 3 cwt. of raspberries, and that the water with the SO_2 was added after 3 *cwt. of fruit had been weighed in.*

Since writing above, we have again read over our suppliers' letter, and we notice that the term "Federation Pack" appears to apply to Continental fruit, and it just occurs to us that the raspberry pulp supplied may not be Scotch raspberry pulp, but Continental pulp. We distinctly ordered Scotch raspberries in SO_2, and we have been invoiced for Scotch raspberries.

We regret that this letter has run into such a length, but the whole point of it is: In buying Scotch raspberries in SO_2, are we buying water with the fruit, that is, added water? If so, the real price is much dearer than the apparent price, and Scotch raspberries in SO_2 at £20 a ton (or what we have got at this price, if Scotch) seems bad buying compared to Tasmanian raspberry pulp in tins *at £26. The latter are splendid solid pack, and give no trouble whatever, whereas the "Scotch" are inferior in every way.* (Ireland.)

We think that the reason you have found Scotch raspberries to be dearer than Tasmanian may possibly be due to the different duties which apply in the I.F.S. There is always a proportion of water and SO_2 added to Scotch pulp, and we understand that the usual amount is about 8 gal. to 3 cwt. of fruit.

Most packers standardise their casks at 3 cwt. net weight of fruit, but the amount of water should always be ascertained, as different packers use different amounts.

If your casks contain 3 cwt. net contents, in all probability the weight of fruit would be about 2½ cwt., the difference being made up of water and preservative. Many people do think that Tasmanian raspberries at £26 per ton are a better proposition than Scotch pulp at £20 per ton, but we think that you will find, apart from cost, a proportion of Scotch pulp is beneficial in preserving the bright appearance.

Horseradish Cream

1,933. *We shall be obliged if you will help us by supplying formulæ and methods for making horseradish cream and also junket powder.* (London.)

A recipe by way of example was suggested, incorporating horseradish which has been soaked in vinegar for forty-eight hours, corn meal, sugar, salt, condensed unsweetened milk, gum tragacanth, mace, and vinegar.

As regards the second part of the question, the enquirer was referred to the article on rennet in the February issue.

Agar-Agar in Jam

1,934. *Will you kindly inform us as to the method of using agar-agar in the manufacture of jams?* (Palestine.)

The agar-agar may be soaked in cold water for about ten hours, using, say, 1 lb. to 4 gal. of water, and then draining off the water. The proportion of agar required to ensure firmness will depend on the particular pulp employed and the sugar and pectin contents. The soaked agar is well stirred into the boil when the temperature has reached 200° F. A 112-lb. boil may, for instance, require about 1 lb. soaked agar, but if the pectin content is relatively high about 12 oz. may be found sufficient.

Preparation of Pickles

1,935. *Please give particulars of methods for preparing mixed pickles, onions, and sliced beetroot.* (Scotland.)

We have given information on these in previous issues. Some instructions on preparation of mixed pickles were furnished to the enquirer.

Pickling of Green Gherkins

1,936. *Please give instructions on the pickling of green gherkins.* (New Zealand.)

One method was quoted in which, after running off all the brine from a cask of gherkins, the cask is filled up with a hot solution of turmeric and caramel. The cask is then tightly bunged, given a roll, and allowed to stand for forty-eight hours, rolling at intervals. The coloured water is then run off and the pickling is done in a 4½ per cent. solution of acetic acid. Contact with copper or alum should be avoided.

Chicken Essence

1,937. *I should like to ask if you will be good enough to give me the names of three or four firms who may be interested in the importation of chicken essence from East Africa?* (London.)

Possibly some of our readers may be interested in this proposition.

Preserved Ginger

1,938. *We propose adding to our manufactures preserved ginger, and would appreciate any information which you can give us on the subject.* (Australia.)

We suggest you try the following method:

Drain the ginger well and then cut it up. Place in cold water in a steam-pan, gently bringing to the boil and simmering for twenty minutes. Place in sieves to drain. Transfer to a cold syrup of 4 lb. sugar to each gallon of water, and allow to stand until next day. Transfer all to steam-pan, gently bring to the boil and simmer for fifteen minutes. Then place in a clean dry tub and allow to stand until next day. Run off the syrup into the steam-pan and add 3 lb. sugar to each gallon of syrup. Stir well and bring to the boil. Return this syrup to the ginger in the tub and allow to stand until the following day, then placing in sieves to dry. Roll in sugar and shake out the loose sugar through a coarse sieve. Lastly, spread out to dry.

Meat Extract

1,939. *You would oblige us very much indeed by kindly recommending a recipe for a meat extract fluid; that is to say, in what way an ordinary solid highest quality Argentine meat extract ought to be treated in order to become fluid instead of solid, and, of course, keeping its perfectly good quality as merchandise. In what proportions should water, salt, etc., be added? No vegetables should enter. We give below an analysis of the meat extract we intend to use.* (Sweden.)

The preparation of fluid extracts like Bovril and Oxo from bulk extract of beef is of course a trade secret.

A product which will be fairly fluid can be made from the extract whose analysis you quote by breaking it down with water to a moisture content of approximately 47 per cent.

Hence, 53 parts of the extract should be well mixed in a jacketed pan with 28·2 parts of water.

The addition of salt is necessary. This should be 10 per cent. If 90 parts of the broken-down extract are mixed with 7·65 parts of pure salt, this will give 10 per cent. in the final mixture. This admixture will throw the moisture content out a little, but it is a matter of calculation.

This will not make a product exactly like Bovril because different extracts are blended, but it answers your query. The stuff should keep well, although it should be filled when quite hot and, of course, the bottles or jars should be well sterilised before filling.

Incidentally, there may be found large crystals in the South American extract, and these should be removed by a fine sieve at the time of breaking down the extract with water. They mainly consist of phosphates.

A Tinny Flavour

1,940. *We are canning ham and beef in small pieces in gelatine and find on opening the tin that the flavour is "tinny". Will the addition of pepper or spice eliminate this flavour, or how can it be avoided?* (U.K.)

With only this meagre information to go on, and no sample, it is quite impossible to venture any intelligent suggestion. The enquirer should submit a sample to a bacteriologist for a preliminary examination and then one would have some tangible data upon which to base a verdict.

Potato Crisps

1,941. *As a subscriber to your journal,* FOOD MANUFACTURE, *we would esteem it a favour if you could give us some information regarding the manufacture of Potato Crisps.*

What we particularly desire to know is the method of preparing Potato Crisps: if dipped into any batter before cooking; method of drying, that is, is there any alternative to the centrifuge principle; also if any particular kind of potato is recommended, and the class of oil used for cooking. Does the potato require to be thoroughly washed after cutting to remove starch?

Perhaps you could inform us of a suitable hydro extractor for drying process, and maker's name. (New Zealand.)

All this information was given in an article published in the February, 1934, issue.

Acid Determination

1,942. *Kindly let me know the technique and apparatus for determining the amount of free fatty acid in lard.* (Ireland.)

Reference should be made to Dr. Lea's discussion published in the March, 1934, issue of FOOD MANUFACTURE.

As regards the determination of the acid value of a fat or oil, we quote Mr. Bolton's instructions. He defines the acid value of a fat or oil (which is a measure of the free fatty acidity) as "the number of milligrammes of potassium hydroxide required to neutralise free fatty acids in 1 gm. of the fat or oil.

Method of Carrying Out the Test.—About 2 to 10 gm. of the fat or oil, depending on the acidity, are weighed into a 250 ml. flask, and 30 to 50 ml. of 95 per cent. alcohol (which has just previously been boiled and rendered faintly pink to phenolphthalein by the addition of N/10 NaOH) added. The mixture of fat and alcohol is brought to the boil (the oil does not usually dissolve, but the solution of the free fatty acids will have been effected) and titrated hot with N/10 NaOH till a faint pink colour, permanent on shaking the contents of the flask, is attained. In the case of 'acid oils' and other oils of high acidity, it is advisable to use N/2 NaOH for the titration. The acid value is calculated by the following formula:

$$\text{Acid value} = \frac{N \times 5{\cdot}61}{W}$$

where N equals number of millilitres of N/10 NaOH used. W equals weight of fat taken."

Any supplier of laboratory apparatus will provide the equipment which is required.

(*Continued on page* 373.)

NEW COMPANIES

CREAMERIES OF CHORLTON, LIMITED. To carry on the bus. of dairymen, etc. Nom. Cap.: £20,000. Dirs.: Nellie Hitchcock, The Cottage, Mottram Road, Alderley Edge, Cheshire; F. Hitchcock, The Cottage, Mottram Road, Alderley Edge, Cheshire; R. C. Bliss, 22, Rosslyn Road, Chorlton-cum-Hardy. Qual. of dirs.: £50 shares.

C. WEBB, LTD. To take over the bus. of confectioners, bakers, etc., cd. on at Altrincham, Cheshire, as "C. Webb." Nom. Cap.: £3,000. Permt. dirs.: J. Formstone, 10, White Friars, Chester; F. Hack, 10, White Friars, Chester; W. E. Anfield, 13, Lower Bridge Street, Chester; F. Benyon, Blantyre, Queen's Park, Chester; F. B. Duck, Lawn House, Sandy Lane, Prestatyn. Qual. of dirs.: £100 shares.

DISTILLERY AND VINEYARDS EXPORT COMPANY, LIMITED. To carry on the bus. of wine and spirit importers, exporters, mnfrs. and mchts., etc. Nom. Cap.: £3,000. Dirs.: A. M. L. Thompson, address not stated; W. F. Hammond, address not stated. Qual. of dirs.: 500 shares. Subs.: J. F. Baker, 2, Duncan Avenue, Gray's Inn Road, W.C.; S. A. Perkins, 62, High Holborn, W.C.

DOUGHNUT AND CRUMPET KING, LIMITED. 97, High Street, Walthamstow, E. 17. To carry on the bus. of mnfrs. of and dlrs. in doughnuts and crumpets, etc. Nom. Cap.: £900. Permt. dirs.: Kate Schneider, 97, High Street, Walthamstow, E. 17; I. Morris, 36, First Avenue, Dagenham, Essex; A. Schneider, 97, High Street, Walthamstow (ch.); Qual. of dirs.: £1. Remuneration of dirs.: As voted by the company.

EPIC NUT AND FOOD PRODUCTS, LIMITED. To take over the bus. of importers, exporters, and mnfrs. of prepared Indian nuts cd. on at 204-6, Old Street, E.C., as the "Epic Nut Company". Nom. Cap.: £5,000. Permt. dirs.: H. Attari, 19, Berkeley Street, W. 1 (permt. deputy-ch.); G. S. Ramulu and A. Nadir, addresses not stated. Qual. of dirs.: One share. Remuneration of dirs.: As voted by the company. Sub.: Mrs. R. A. Nadir, 25, Delta Court, Coles Green Road, N.W. 2.

FIELDS FOOD PRODUCTS, LIMITED. 52, Brunswick Street West, Hove. To acquire a recipe for the manufacture of cheese straws, etc. Nom. Cap.: £1,000. Dirs.: A. A. Lindo, 11, Park Crescent, Portland Place, W. 1 (ch.); J. H. Field, 86, Lansdown Place, Hove (managing dir.). Qual. of dirs.: £50 shares. Remuneration of dirs.: As voted by the company.

GEORGE S. FOSTER, LIMITED. To carry on the bus. of mnfrs., cultivators, and sellers of butchers' sundries, herbs, seasonings, and food preparations, etc. Nom. Cap.: £1,500. Dirs.: G. S. Foster and R. E. Foster, both of 12, Kenley Road, S.W. 19. Qual. of dirs.: 100 shares.

JAMES MATHESON'S ANIMAL PRODUCTS, LIMITED. To carry on bus. as mill proprietors, millers, mnfrs. of and dlrs. in foodstuffs of every description, etc. Nom. Cap.: £100. Dirs.: To be appointed by the subs. Remuneration of dirs.: As voted by the company. Subs.: Mary Dicker, 45, Bloomsbury Square, W.C. 1 (clk.); C. M. Kidd, 45, Bloomsbury Square, W.C. 1 (solr.).

J. H. MARLAND, LIMITED. To carry on the bus. of bakers, etc. Nom. Cap.: £6,000. Dirs.: J. Marland, The Moorings, St. Annes-on-Sea (permt. managing dir.); H. Nield, Branston, 41, Wibbersley Drive, Flixton, Manchester. Qual. of managing dir.: 100 shares. Other dirs.: 10 shares. Remuneration of dirs.: As voted by the company.

J. I. DICKS, LIMITED. 263, Seven Sisters Road, N. 4. To carry on the bus. of caterers, bakers, confectioners, etc. Nom. Cap.: £5,000. Dirs.: J. I. Dicks, 24, Chessington Avenue, Finchley, N. 3; Mrs. D. Dicks, 24, Chessington Avenue, Finchley, N. 3. (J. I. Dicks is permt. ch. and managing dir.)

JOHN CLEAVE (DEVON), LIMITED. East Street, Crediton, Devon. To take over the bus. of mnfrs. of and dlrs. in confectionery cd. on at Crediton, Devon, by Twyford Toffee, Ltd. Nom. Cap.: £5,000. Dirs.: J. R. J. Macnamara, 10, Holland Road, W. 14; Beatrice M. Paul, The Bakery, Fore Street, Cullompton; W. Brooks, 100, Exeter Road, Cullompton, Devon; W. T. Brooks, 102, Exeter Road, Cullompton, Devon; and three others. Qual. of dirs.: 10 shares. Remuneration of dirs: As voted by the company.

J. S. BONITTO AND COMPANY, LIMITED. To carry on the bus. of shippers, agents, mnfrs. of and dlrs. in cocoa, tea, coffee, tobacco, rubber, etc. Nom. Cap.: £10,000. Dirs.: J. S. Bonitto, 40, King William Street, E.C. 4; T. Juncker, Aarhas, Denmark (ch.).

J. STEVENS (SURREY), LIMITED. 56, Durham Road, West Wimbledon, S.W. 20. To take over a bakery and confectionery bus. Nom. Cap.: £3,000. Dirs.: J. Stevens, 56, Durham Road, S.W. 20; J. Stevens, senr., 36, Garden Avenue, Mitcham, Surrey; Florence M. Stevens, 56, Durham Road, S.W. 20. Qual. of dirs.: £100. Remuneration of dirs.: As voted by the company.

MALT - WHEAT PRODUCTS, LIMITED. Bristol Street, Gloucester. To take over the bus. of maltsers of wheat cd. on by J. M. Collett and Co., Ltd., at Mitcheldean, Glos., and elsewhere. Nom. Cap.: £10,000. Dirs.: J. H. Collett, 7, Pittville Crescent, Cheltenham; G. F. Collett, Battledown Gates, Cheltenham; H. Hosegood, Stoke Leigh, Stoke Bishop, Bristol; G. Godwin, Bartlow, Luckhampton Hill, Cheltenham.

PROCESSED MILK SUPPLIES, LIMITED. Dashwood House, Old Broad Street, E.C. 2. To carry on bus. as mnfrs. and importers of and dlrs. in milk and milk products, etc. Nom. Cap.: £500. Dirs.: L. de Winter, Schubertstraat 33, Amsterdam, Z.; L. Thomson, 7, The Fairway, Upminster, Essex.

ROLLO TEA ESTATES OF CEYLON, LIMITED. 25, Fenchurch Street, E.C. To take over certain tea estates in Ceylon, etc. Nom. Cap.: £160,000. Dirs.: Lieut.-Col. W. K. Rollo, M.C., Wynyates, Orchard Rise, Richmond, Surrey; C. A. Cuthbert, Westoun, St. Andrews, Fife, Scotland; J. A. D. Finch Noyes, 25, Fenchurch Street, E.C. 3; H. A. Roberts, 2, Suffolk Lane, E.C. 4. Qual. of dirs: 100 ord. shares. Remuneration of dirs (except any managing dir.): £75 each per annum (ch., £175).

SUNNYSIDE BAKERIES, LIMITED. To carry on the bus. of bakers, etc. Nom. Cap.: £10,000. Dir.: T. W. Howard, 101, Abbeville Road, S.W. Qual. of dirs.: £100 shares. Remuneration of dirs.: £25 each per annum (ch., £25 extra). Sub.: N. Young, 135, The Greenway, Pinner Hill, Pinner.

VICARS (PORTSMOUTH), LIMITED. 12, High Street, Cosham, Hants. To carry on the bus. of mnfg., wholesale, and retail confectioners, etc. Nom. Cap.: £1,000. Permt. dirs.: H. V. Willows, 137, Kirby Road, Portsmouth; N. Fitch, 66, Highbury Grove, Cosham, Hants.

WM. COX AND SONS, LIMITED. St. George's Street, Winchester. To take over the bus. of chocolate specialists cd. on by W. R., W., and A. J. Cox at Winchester. Nom. Cap.: £1,000 in £1 shares (500 ord. and 500 pref.). Life dirs.: W. R. Cox and W. Cox, Alacote, Pitt Corner, Winchester; Berthe M. Cox, address not stated. Qual. of dirs.: 5 ord. shares.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

INFORMATION AND ADVICE (continued from page 372)

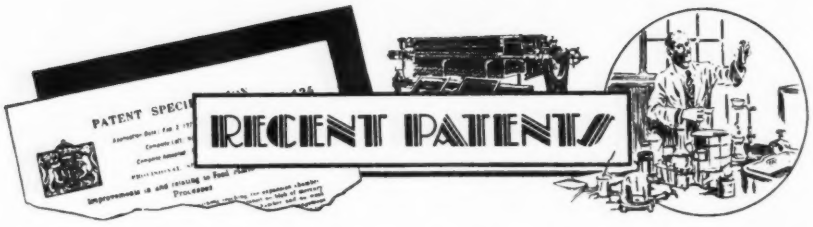
Pectinol

1,943. *I notice in* FOOD MANUFACTURE *for August reference in one of your leading articles, under the heading of "Apple Juice", to an enzyme preparation called Pectinol.*

Can you please put me in touch with the manufacturers or suppliers of this preparation, and can you give me any further information concerning its use and whether it is being manufactured on a commercial scale? (England.)

The name of the suppliers was given.

Other preparations have been used in the course of experimental work on the clearing of fruit juices by Charley at Long Ashton and the American workers, concerning which we have published matter on several occasions in the past.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

21919. HIMMELSBACH, H.: Manufacture of beverage from whey. August 2.
22136. MOBLEY, L. K.: Milk products. August 6. (United States, August 4.)
22402. HOPPER, W. S., and KING, H. J. H.: Manufacture of malt. August 8.
22410. BYWATER AND CO., LTD., M., and WIMBUSH, A. D.: Preservation of foodstuffs, etc. August 8.
22515. SCOTT, R.: Edible jellies. August 9.
22552. NATIONAL EQUIPMENT CO.: Mechanism for handling confections, etc. August 9.
22591. BRIERLEY, COLLIER, AND HARTLEY, LTD., W., HARTLEY, W. T. D., ORMESHER, H., and TURNBULL, F. G.: Apparatus for cutting drained peel, etc. August 10.
22597. COOPER, M. K.: Appliance for moulding pats of butter, etc. August 10.
22707. ROWNTREE AND CO. (IRELAND), LTD., and MCMURTY, F. R., and SIXSMITH, H.: Sweet-making machinery. August 12.
22786. HOLTE, H., and NILSON, T.: Apparatus for rendering fat from tallow, etc. August 13.
22894. DU PONT DE NEMOURS AND CO., E. I.: Production of baked cereal products. August 14. (United States, August 14, 1934.)
22920. GRIFFIN, W. A.: Butter-pat marker. August 14.
23271. IMPERIAL CHEMICAL INDUSTRIES, LTD., and FAWCETT, E. W., and WHITTAKER, D.: Production of oils rich in vitamins. August 19.
23374. CLELAND, LTD., W. W., and GEDDES, W. M.: Packing for eggs, etc. August 20.
23635. ELY FRUIT PRESERVING CO. (1932), LTD., and HORSFALL, E.: Process for cooking, etc., fruit in bottles. August 23.
23727. DICKESON, T. W.: Process for production of foods. August 23.
23759. JOHNSON, F. (legal representative of Johnson, J. Y.) (I.G. Farbenindustrie Akt.-Ges.): Colouring foodstuffs. August 24.
23780. IRELAND, R. F.: Apparatus for coffee, etc., infusions. August 24.
24032. BIRNIE, F. R.: Storing, etc., fruit. August 28.
24071. RASMUSSEN, A. GERNER-: Preservation of fruits. August 28. (September 28, 1934.)
24072. GENERAL FOODS CORPORATION: Preparing pectin. August 28. (United States, August 28, 1934.)
24073. GENERAL FOODS CORPORATION: Production of calcium pectinate. August 28. (United States, August 28, 1934.)
24099. BROMHEAD, W. S.: Dairy products. August 29.
24124. MATZKA, W.: Preservation of liquids. August 29.
24275. GRIFFITH LABORATORIES, INC.: Meat-curing salt. August 30.
24297. HENE, E.: Production of clarifying agents. August 30.
24416. DAIRY ACCESSORIES CO., LTD.: Appliances for filling milk bottles, etc. September 2.
24509. LAFORGE, P. C. N.: Fruit-pressing apparatus. September 2.

Complete Specifications Accepted

432,694. JENNINGS, H. W. K. (BORKOWSKY, A.): Treatment of soya beans and the products obtained thereby.
432,771. KELLE, W., and CARLSSON, F.: Process for freeing from fat or oil substances containing fat or oil, such as meat, fish, and fruits.
432,894. FEAGLES, R. L.: Process of preventing the deterioration of milk, cream, or any other dairy products.
432,985. WADA, C.: Manufacture of a concentrated food product.
433,005. FEREMUTSCH, P., and VIELI, O.: Method for sterilising liquids, especially milk. (July 24, 1933.)
433,102. FROMAGERIES BEL SOC. ANON.: Cartons and like packings for alimentary or other products. (August 16, 1934.)
433,134. WENTWORTH, H. A.: Preserving raw fish liver, and the product obtained thereby. (February 8, 1933.)
433,150. KUTCHERA, A. J.: Pasteurising apparatus. (February 11, 1933.)
433,242. HOPKINSON, L. T.: Method of canning salmon, and product resulting therefrom.
433,297. NAYLOR, W. H., and DAY AND SONS, LTD., J.: Means for packing flour and other similar substances.
433,325. ARNOTT, LTD., W.: Method of packing biscuits, cakes, and the like. (April 11, 1933.)
433,413. STANDARD BRANDS, INC.: Manufacture of bread, rolls, and like baked products.
433,471. DU PONT DE NEMOURS AND CO., E. I., REICHERT, J. S., and SPARKS, W. J.: Preparation of bread and other baked cereal foodstuffs.
433,576. ELACT GES. FÜR ELEKTRISCHE APPARATE GES.: Apparatus for eliminating by electric current the acid from milk, dairy products, dairy leavings, and other liquids.
433,580. EGGART, F., and HELFF, E.: Heating of the contents of food receptacles such as cans and the like by means of self-contained heating devices.
433,678. JAHN, A. R.: Method of concentrating milk and milk mixtures, and apparatus therefor.
433,915. FIELD, A. W., and BIRD AND SONS, LTD., A.: Production of concentrated table-jelly tablets.
433,930. AKTIESELSKABET FERROSAN. Extraction of the vitamin-containing unsaponifiable components of fatty matters.
434,037. RABATÉ (née Grillon), S. G., MACÉ, A., and CLÉMENT, J.: Manufacture of pure hydratopectin.
434,137. HINRICHS, W. J. H.: Preservation of fruit. (March 15, 1933.)
434,249. DINICH, K.: Process for making bakers' yeast from brewers' yeast.
434,324. ZWICK, F. (trading as Schachtelkäsefabrik F. Zwick): Process for preserving rindless cheese. (January 23, 1934.) (Cognate Application 1529/35.)
434,458. CARBA DRY ICE (AUSTRALIA), LTD.: Preservation of perishable substances during transport or storage. (December 22, 1933.)

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

428,434. GROUP NO. III. **Irradiating liquids.** HANOVIA CHEMICAL AND MANUFACTURING CO., Chesnut Street, Newark, New Jersey, U.S.A. (Assignees of Trebler, H. A., 1403, Eutaw Place, Baltimore, U.S.A.).

Apparatus for irradiating milk comprises one or more inclined or vertical surfaces 5

FIG. 1.

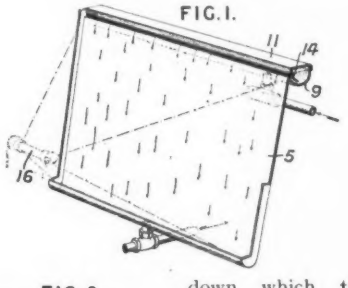
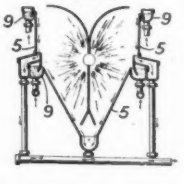


FIG. 6



down which the milk flows while being exposed to an ultra-violet lamp 16, a trough 9 at the upper edge of each surface, and a baffle 14 dipping into the liquid to retain air bubbles and foreign matter. The baffle is preferably integral with the cover 11 of the trough. The edge of the trough and the upper edge of the sheet are joined to form a sharp edge. Several troughs and surfaces may be arranged around a single lamp as shown by way of example in Fig. 6.

429,035. GROUP NO. II. **Pneumatic separating.** CUPPY, H. A., Lititz, Pennsylvania, U.S.A.

A classifier for sugar, cocoa, etc., comprises a vertical pipe 5, Fig. 1, through which the material is carried in a current of air and from which it is discharged laterally through tangential slots 7 into a frusto-conical part 10 of a vertical casing 1. An annular channel 12 at the bottom of the casing 10 directs a current of air upwardly through the dispersed material and carries off the fines, allowing the coarser grade to drop from the bottom of the casing. Preferably the casing is provided at the top with an inverted conical part 4 which carries a baffle ring 19 disposed over a funnel 17 and surrounding the air outlet pipe 20 leading to a fan 22. Material deposited in the funnel 17 is led

FIG. 1.

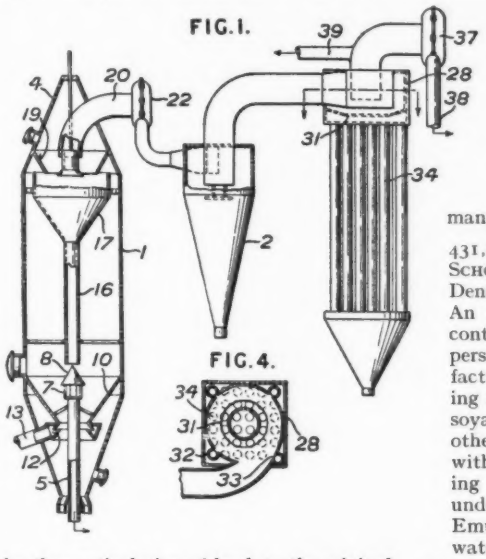


FIG. 4.

by the vertical pipe 16 back to the original point of discharge, the top end of the pipe 5 being provided with a spreader cone 8. The air exhausted from the separator by the fan 22 is passed first through a cyclone 2 and is finally cleaned by being discharged tangentially into an annular chamber 28, Fig. 4, having peripheral slots 33 leading to vertical tubes 32 which collect some of the material. The other material passes over the edge 31 of the annular bottom of the chamber into the filter tubes 34 through which some of the air is dissipated. The rest of the exhaust air may be drawn off by the fan 37 and returned through the pipes 38, 39 to the air-supply pipe 13 and to the mill for feeding the material to the pipe 5.

429,664. **Decolourised black pepper.** LEVINSON, A. A., 6126 North Washtenaw Avenue, Chicago, U.S.A.

A process is described for extracting from black pepper the flavouring materials, oleoresins, essential oils, etc., in a condition free from chlorophyll and other natural colouring matters. In the past the use of black pepper as such in the ground state has been restricted owing to the undesirable colour, notwithstanding the fact that the flavour is much richer than that of white or decorticated pepper. The essential stages in the operation are extraction of oleoresins and chlorophyll with a solvent immiscible with water, agitation with a solvent for chlorophyll which is miscible with water and partly miscible with the solvents of the original solution, and, finally, dilution of the combined solution and solvent with water in order to separate a solution of the oleoresins. The process is claimed to be applicable to all other spices containing oleoresins and chlorophyll, including sage, thyme, parsley, and caraway.

430,417. **Solid vehicle for mineral acid preservation of green foodstuffs.** CHEM. FABRIK KALK GES. and DR. H. OEHME, Koln-Kalk, Germany.

Claims are made for carbonised residues formed on contacting concentrated sulphuric or phosphoric acid with coal, peat, or cellulosic material, such residues acting as carriers for the excess acid. The products can be distributed in green fodder by farmers, etc., and act very uniformly and for a longer period than the free liquid acids previously used. No special precautions have to be taken in handling, and transport dangers are largely eliminated. (Convention date, Germany, December 12, 1932.)

431,065. **Emulsion shortening for dough.** SCHOU, H., Palsgaard, Juelsminde, Denmark.

An emulsion product having a fatty continuous phase and an aqueous dispersed phase is specified, the manufacture being illustrated by the following example: 70 parts of a mixture of soya bean oil and solidified fat (or other pure oil-fat mixtures) are mixed with 1·5 to 2 parts of a water-dispersing agent such as the product known under the trade name of Palsgaard's Emulsion Oil, followed by 30 parts water containing possibly a little common salt. Such an emulsion is claimed to yield high quality bakery products even when used in comparatively small percentage. The proportion of fat in the oil-fat mixture should be adjusted to the season, more solid fat being required in summer than in winter.

431,087. **Dried milk product with high peptone content.** AXELROD, A., 45, Hadlaubstrasse, Zurich.

The process described in E.P. 342,083 (treatment of sterilised milk, prior to drying, with peptonising bacteria which produces little or no lactic acid) is now improved in that not only are the milk proteins converted into a soluble, easily digestible form, but both albumen and casein are now extensively peptonised without danger of putrefying fermentation. This is achieved by allowing acid fermentation to proceed while depriving the milk sugar of its ability to increase the virulence of the lactic acid bacteria to such an extent as to interfere with development of the non-acidifying peptone bacteria also present. Example: 100 litres skinned milk pasteurised at 90° C. and cooled to 25° C. are treated with 3 litres of pure culture of micrococcus casei liquefaciens and ½ litre of lacto-yeast culture. After keeping for 12 to 24 hours at 25° to 30° C., addition is made of ½ litre of culture of bacillus caucasicus and the mass heated to 35° to 37° C. After a period of 3 to 24 hours the peptone content is found to be about 7·4 per cent. (calculated upon the dry content) and the acidity 80° to 100° Soxhlet-Henkel. The product is finally cooled down to 10° C. before drying in the usual manner. (Convention date, Germany, February 27, 1934.)

RECENT TRADE MARKS

(Continued from page 376.)

WESTONIA. — 560,286. **Confectionery, biscuits, cakes, and bread.** WESTON BISCUIT CO., LTD., 309, Thames House, Millbank, London, S.W. 1. July 3.

WHITE VELVET.—561,046. **A preparation for making lemon and barley water.** J. A. FRANCE AND SON, LTD., Andrews House, Gallowgate, Newcastle-on-Tyne. July 24.

WILTSOME.—559,980. **Table poultry and eggs.** WILTSHIRE EGG PRODUCERS, LTD., Eddington, Hungerford. July 10.

WINDJAMMER. — 560,995. **Dates, nuts for food, dried fruits, canned fish, canned fruits, and canned vegetables.** BARROW, LANE AND BALLARD, LTD., Pudding Lane, London, E.C. 3. July 31.

WIRE-CHOCS. — 559,882. **Chocolates.**

GEORGE MORLEY SWAIN, trading as Confectionery and Telegraph Services, Clifton Chambers, Clifton Crescent, Birkenhead. July 3.

Registration of this trade mark shall give no right to the exclusive use of the box device.

557,304.—**Yeast.** AKTIESELSKABET DANSK HANDELS-ORGINDUSTRI-COMPAGNI DANISCO, 31, Havnegade, Copenhagen K, Denmark. May 29. (Associated.)

YORKSHIRE MAID. — 558,681. **Butter, cream, cheese, and condensed milk.** COW AND GATE, LTD., Cow and Gate House, Stoke Road, Guildford, Surrey. July 10. (Associated.)

(By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the words "Yorkshire Maid".

The applicants undertake to use the mark only on goods produced in Yorkshire.

ZILLA.—554,764. **Margarine and edible fats.** THE PEERLESS REFINING CO. (LIVERPOOL), LTD., 49 to 59, Cheapside, Liverpool. March 6.

555,262. **Substances for use as food or as ingredients in food, but not including canned fruits or canned vegetables, and not including any goods of a like kind to canned fruits or canned vegetables.** SAXON, POWELL, AND COOPER, LTD., proprietors of the firm known as The London Health Centre, 9, Wigmore Street, London, W. 1. April 24. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the words "The Mark of Integrity".

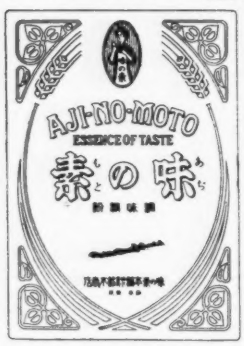
RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

ABECASSIS. — 558,930. **Sardines.** The firm trading as ABECASSIS, IRMÃOS AND Co., Largo do Municipio 32, Lisbon, Portugal. September 11.

Registration of this trade mark shall give no right to the exclusive use of the word "Abecassis".

AJI-NO-MOTO. — B 559,758. **Seasonings (for food).** KABUSHIKI KAISHA SUZUKI SHOTEN, 7, Itchome, Takara-Machi, Kyobashi-ku, Tokyo, Japan. September 11.



Userclaimed from March 3, 1920.

The applicants undertake that this mark, when registered, and the mark No. 424,574 (2324), shall be assigned or transmitted only as a whole and not separately.

The transliteration of the Japanese characters appearing on the mark is as follows:

On the female figure and enlarged in the centre of the mark: "Aji-no-moto", meaning "Essence of taste", the Japanese pronunciation of "Aji-no-moto" being indicated by the adjacent small characters.

Beneath the central characters: "Chomiseifun", meaning "Refined powder for flavouring".

At foot of mark: 1st line, "Kabushiki Kaisha Suzuki Shoten", being the applicants' name; 2nd line, "Nippon Tokyo", meaning "Japan Tokyo".

ATLANTIS-CANARIAS. — 559,069.

559,069. **Bananas.** SINDICATO AGRICOLA DEL NORTE DE GRAN CANARIA, Leon y Castillo Street, Las Palmas, Canary Islands. August 21.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the devices of bananas and the word "Canaries".

The applicants undertake to use the mark only on bananas produced in the Canary Islands.

BARN.—560,596. **Condensed milk.** CONDENSED MILK PRODUCERS, LTD., 44, Queen Victoria Street, London, E.C. 4. August 28. (By Consent.)

Condensed milk will be struck out from the goods of Registration No. 294,162 (1534) if and before the applicants' mark is registered.

BLACK PRINCE.—560,233. **Dried currants.** LOUIS LEVI GORDON, trading as Hull Supply Co., 12 to 16, Blanket Row, Hull. August 21.

User claimed from October 30, 1914. Section 21.

Registration No. 547,667 (2919) will be cancelled if and before the applicant's mark is registered.

BRISLET.—561,003. **Fish.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. July 31.

Registration No. 510,028 (2718) will be cancelled if and before the applicants' mark is registered.

BULAC. — B 559,594. **Soured milk (for food).** FRANCIS EDGELL ASHLEY, trading as The New Research Company, Orchard House, Station Road, Normandy, Guildford. September 4.

User claimed from October 31, 1925.

CONCERT.—560,908. **Biscuits.** BEE BEE BISCUITS, LTD., Sunya House, Scrubs Lane, Cumberland Park, Willesden, London, N.W. 10. August 21.

Registration No. 418,320 (2276) will be cancelled if and before the applicants' mark is registered.

COPEX. — 561,757. **Cooking fats.** THE SCOTTISH CO-OPERATIVE WHOLESALE SOCIETY, LTD., 95, Morrison Street, Glasgow. August 21.

DAIRYDOWN. — 560,392. **Milk, milk powder (for food), butter, cream, and eggs.** THE SCOTTISH MILK MARKETING BOARD (constituted under the Scottish Milk Marketing Scheme [Approval] Order, 1933), 95, Bothwell Street, Glasgow. August 28.

DRIPECT.—561,187. **Substances used as food or as ingredients in food.** BURGOYNE, BURBIDGES AND Co., LTD., High Street South, East Ham, London, E. 6. September 4.

EARLY MORNING.—561,841. **Biscuits, cakes, and confectionery.** HUNTLEY AND PALMERS, LTD., King's Road, Reading, and 162, Fenchurch Street, London, E.C. 3. September 11.

ELECTRA.—554,791. **Fresh tomatoes and bananas.** BRUNO NARANJO DIAZ, 1, Colmenares Street, Las Palmas, Gran Canaria Island. August 28.

User claimed from the year 1906. Section 21.

FAREX. — B 557,694. **A cereal food.** JOSEPH NATHAN AND Co., LTD., 16, St. Helen's Place, London, E.C. 3. August 28. (By Consent.)

User claimed from June 11, 1932.

F. ROWLAND. — 560,999. **Watercress.**

FRANK ROWLAND (ALRESFORD WATERCRESS), LTD., East Street, Alresford, Hampshire. September 11.

GOLDEN PETAL.—561,006. **Tea.** PEEK BROS. AND WINCH, LTD., 20, Eastcheap, London, E.C. 3. August 21. (By Consent.)

Registration No. 288,336 (1508) will be cancelled if and before the applicants' mark is registered.

H. EARLE.—560,748. **Substances used as food or as ingredients in food.** JOHN HUDSON EARLE, trading as H. Earle, Newgate House, Newgate Street, Cottingham, East Yorkshire. August 21.

Registration of this trade mark shall give no right to the exclusive use of the words "Cottingham Farm".

JAF-ORA. — 559,262. **Beverages and cordials (not alcoholic, not aerated, and not medicated).** KIA-ORA, LTD., 35 to 38, Rushworth Street, Blackfriars, London, S.E. 1. September 4. (By Consent.)

KAUTENE.—562,102. **Substances used as food or as ingredients in food.** THE GLOBE REFINING Co., LTD., Eugene Street, Pennywell Road, St. Judes, Bristol. September 4. (Associated.)

KHEDIVE.—561,874. **Dried fruits.** T. J. POUPART, LTD., 110, Long Acre, Covent Garden, London, W.C. 2. September 4. (Associated.)

L'ESPERANCE.—559,656. **Cocoa grown in Trinidad.** PAUL LEON GUISEPPI, ALEXANDER ELDER, and HUGH TEESDALE, trading together as Centeno Estates, 6, Frederick's Place, Old Jewry, London, E.C. 2.

SYLVIAN. — 559,851. **Tea.** DOMINION TEA PLANTATION Co., LTD., Love Lane, Liverpool, 3. July 24. (By Consent.)

T.P.M.—559,533. **Butter, bacon, lard (for food), cheese, margarine, tea, sugar, breakfast cereals, jams, coconut, cake mixture, cake for human consumption, tinned fruits, tinned fish, jellies (for food), flour, custard powder, blancmange powder, tinned milk, evaporated fruits, dried fruits, coffee essence, and pickles.** T. P. MOYLE AND Co., LTD., 16, High Street, Blackheath, Staffordshire. August 14.

UNIMUL.—561,292. **Emulsifying preparations for use in making bread and becoming ingredients therein.** THE UNITED YEAST Co., LTD., Unecol House, 238-240, City Road, London, E.C. 1. August 7.

WELSH MAID.—555,474. **Butter.** NURDIN AND PEACOCK, LTD., 59, 61, 63, and 65, Wells Street, London, W. 1. July 24. (By Consent.)

The applicants undertake to use the mark only on butter made in Wales.

Registration of this trade mark shall give no right to the exclusive use of the words "Welsh Maid".

(*Continued on page 375.*)